

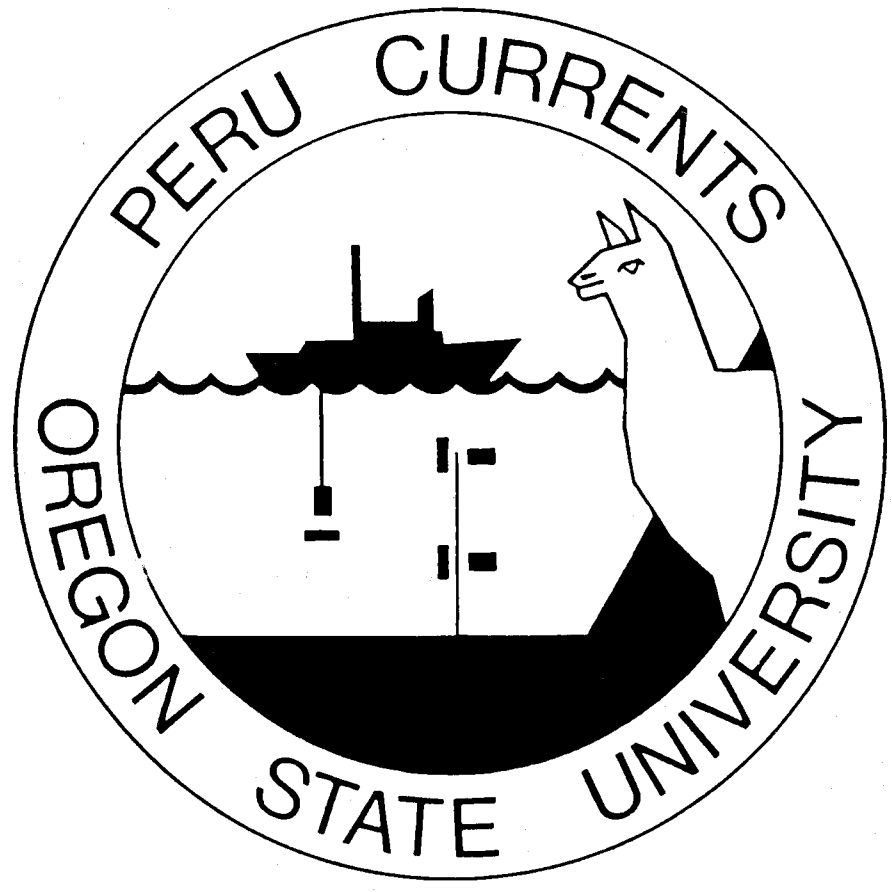
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**Current Measurements
off the West Coast
of South America
November 1981-March 1985**

by
Michaela Knoll
Theresa Paluszkiwicz
Glenna Pittock
Robert E. Still
Robert L. Smith
Adriana Huyer

Data Report 140
Reference 87-31
December 1987

National Science Foundation
OCE-8017929, OCE-8315014, OCE-8709930

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Abstract

Several current meter moorings were deployed over the continental margin of Peru along 5° and 10° S to study the Peru current system. The observation period from November 1981 to March 1985 covered the occurrence of El Niño 1982-83. This report presents the six-hourly low-passed data sets of each mooring. Progressive vector diagrams, stick plots and time series of the east- and northward current component, temperature and pressure are shown. Histograms of speed, direction and temperature as well as a statistical page showing means and standard deviations are also included.

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INTRODUCTION

As part of the Peru Currents Study, current meter moorings were maintained from November 1981 through March 1985 at several locations off the coast of Peru near 5° and 10° S. These moorings provided data for the study of the variability of the eastern equatorial boundary undercurrent off South America, and identified processes by which perturbations in the eastern equatorial ocean are transferred to higher latitudes. The mooring locations and instrument depths were chosen to obtain long-term time series of velocity and temperature in order to define the cross-margin structure of the undercurrent and propagating fluctuations.

The basic array had shelf, slope and offshore moorings to allow a comparison of the variability in the different topographic regimes. The array had elements at less than one baroclinic Rossby radius, and about 1 Rossby radius and at about two Rossby radii from the coast. The array arrangement is illustrated in Figure 1 and specific mooring locations are given in Table 1. During the study the array design was modified due to both instrument constraints and our increased understanding of the processes influencing the region. Moorings were maintained consistently at 5° and 10° S at the shelf and slope. Offshore moorings were added later in the study and the early mooring at 2° S was replaced by the mooring at 4° S, 85° West. The new location coincided better with other studies in progress (Leetmaa, 1984; Leetmaa and Wilson, 1984). The data return at each location varied because of instrument loss, malfunction, or the discontinuation of the Mooring. Figure 2 and Table 2 show the mooring duration at each location.

The velocity and temperature measurements were obtained using Aanderaa current meters on taut-line subsurface moorings. Shelf moorings had

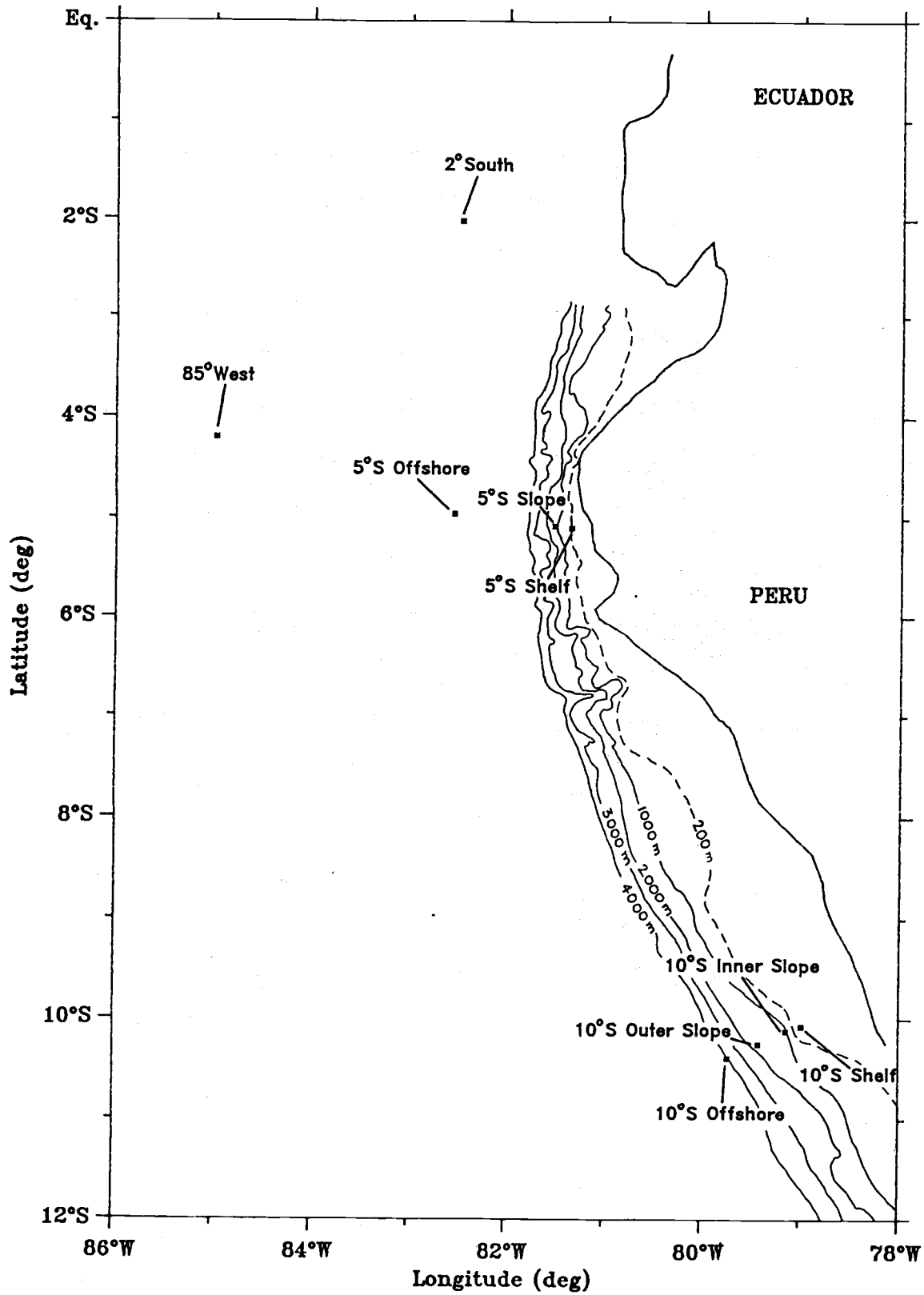


Figure 1. Locations of current meter moorings of the Peru Currents Study 1981-1985

Table 1. Position (latitude, longitude and bottom depth) of each of the current meter moorings during each of the six mooring periods.

	Period I Nov 81-Mar 82	Period II Mar 82-Nov 82	Period III Nov 82-Feb 83	Period IV Feb 83-Nov 83	Period V Nov 83-May 84	Period VI May 84-Mar 85
5° South Shelf	5° 7.5' S 81° 21.0' W 154 m	5° 7.9' S 81° 22.3' W 150 m	5° 6.4' S 81° 20.3' W 145 m	5° 6.3' S 81° 20.8' W 150 m	5° 4.7' S 81° 20.6' W 156 m	
5° South Slope				5° 5.1' S 81° 33.6' W 1598 m	5° 4.9' S 81° 30.8' W 1035 m	5° 4.3' S 81° 30.2' W 1050 m
5° South Offshore				4° 57.7' S 82° 33.1' S 3935 m	4° 57.7' S 82° 33.1' W 3935 m	
10° South Shelf	10° 3.8' S 78° 58.8' W 147 m	10° 4.6' S 78° 58.4' W 148 m	10° 3.5' S 78° 58.4' W 153 m	10° 3.8' S 78° 58.8' W 150 m		10° 0.3' S 78° 59.6' W 150 m
10° South Inner Slope					10° 6.8' S 79° 8.9' W 1045 m	10° 7.4' S 79° 8.3' W 1025 m
10° South Outer Slope	10° 14.2' S 79° 28.2' W 2061 m	10° 15.4' S 79° 28.6' W 2085 m	10° 17.3' S 79° 28.5' W 1990 m	10° 12.8' S 79° 20.0' W 1802 m	10° 14.7' S 79° 19.4' W 1752 m	10° 15.1' S 79° 17.9' W 1760 m
10° South Offshore				10° 23.6' S 79° 43.8' W 4265 m		
85° West				4° 12.2' S 84° 59.0' W 3479 m	4° 12.4' S 84° 57.2' W 3477 m	4° 9.7' S 84° 58.6' W 3487 m
2° South		2° 1.1' S 82° 28.7' W 2451 m				

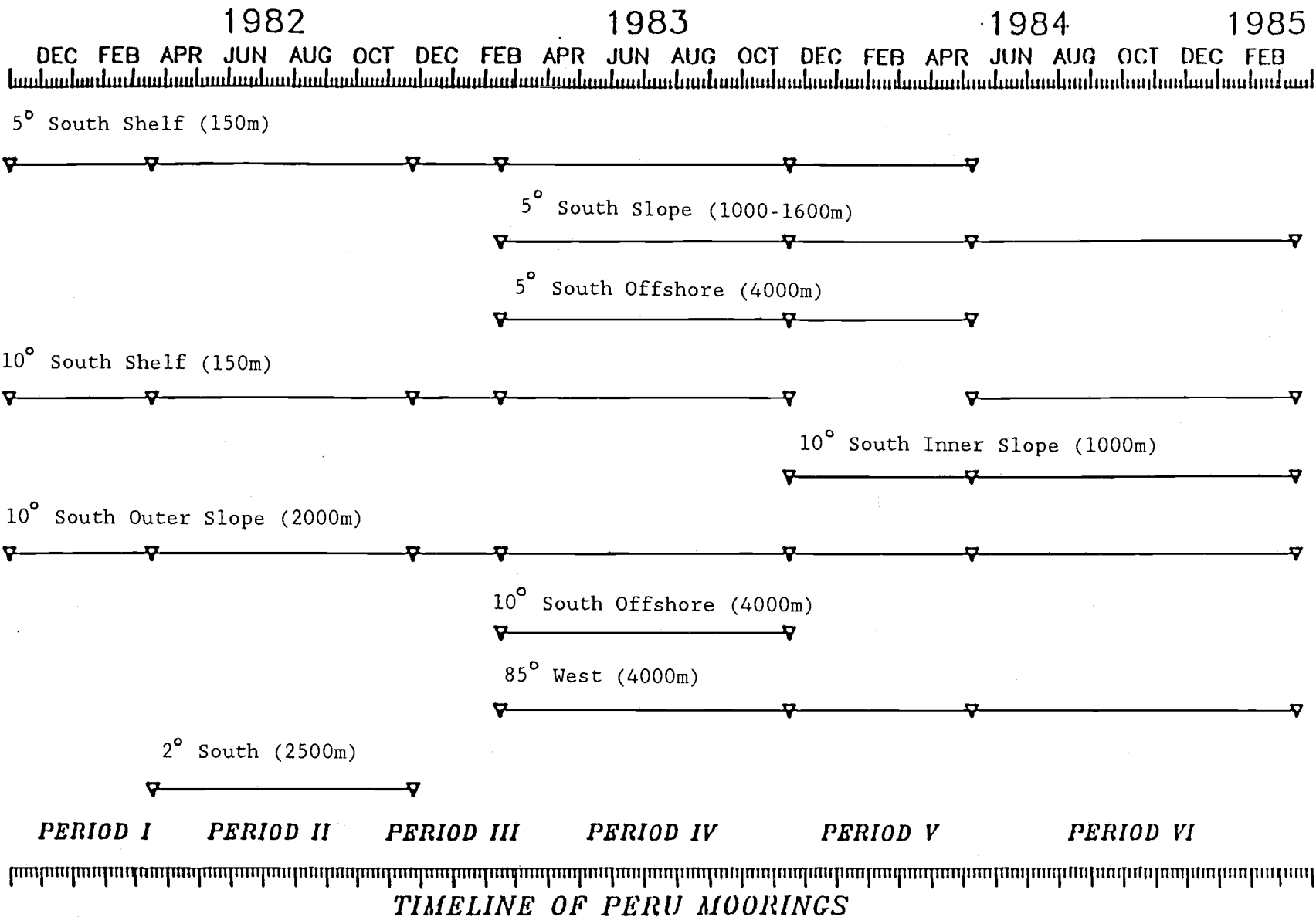


Figure 2. Time line of current meter moorings at each location, showing duration of the six mooring periods and the bottom depth at each location.

Table 2. Length of the data records of the low-passed time series at each location.

A comment is added if gaps in the current (V), temperature (T) or pressure (P) records were bridged.

PERIOD	INSTRUMENT DEPTH [m]	DATA U,V	POINTS T	VELOCITY RECORD DATES (UT)	TEMPERATURE RECORD DATES (UT)	COMMENTS
MOORING 5 South Shelf						
I	62	378	378	0000.01.12.81 - 0600.05.03.82	0000.01.12.81 - 0600.05.03.82	
	112	378	378	0000.01.12.81 - 0600.05.03.82	0000.01.12.81 - 0600.05.03.82	
II	55	180	1059	0000.08.03.82 - 1800.21.04.82	0000.08.03.82 - 1200.27.11.82	
	105	358	1059	0000.08.03.82 - 0600.05.06.82	0000.08.03.82 - 1200.27.11.82	
III	48	280		0600.30.11.82 - 0000.08.02.83	TEMPERATURE OFFSCALE	
IV	55	1127	1127	1800.10.02.83 - 0600.19.11.83	1800.10.02.83 - 0600.19.11.83	
	110	977	1127	1800.10.02.83 - 1800.12.10.83	1800.10.02.83 - 0600.19.11.83	
V	53	537	678	0000.22.11.83 - 0000.04.04.84	0000.22.11.83 - 0600.09.05.84	
	103	397	678	0000.26.11.83 - 0000.04.03.84	0000.22.11.83 - 0600.09.05.84	VBridge
MOORING 5 South Slope						
IV	70	1003	1118	0000.13.02.83 - 1200.21.10.83	0000.13.02.83 - 0600.19.11.83	VTPBridge
	117	740	1118	0000.13.02.83 - 1800.16.08.83	0000.13.02.83 - 0600.19.11.83	VTPBridge
	250	1118	1118	0000.13.02.83 - 0600.19.11.83	0000.13.02.83 - 0600.19.11.83	VTPBridge
	400	1118	1118	0000.13.02.83 - 0600.19.11.83	0000.13.02.83 - 0600.19.11.83	VTPBridge
V	102	667	667	1800.22.11.83 - 0600.07.05.84	1800.22.11.83 - 0600.07.05.84	
	152		667	SPEED SENSOR FAILED	1800.22.11.83 - 0600.07.05.84	
	277	667	667	1800.22.11.83 - 0600.07.05.84	1800.22.11.83 - 0600.07.05.84	
	434	667	667	0000.23.11.83 - 1200.07.05.84	0000.23.11.83 - 1200.07.05.84	
VI	112	593	1265	0600.10.05.84 - 0600.05.10.84	0600.10.05.84 - 0600.22.03.85	
	160	1266	1266	0600.10.05.84 - 1200.22.03.85	0600.10.05.84 - 1200.22.03.85	VBridge
	283	1265	1265	0600.10.05.84 - 0600.22.03.85	0600.10.05.84 - 0600.22.03.85	
	434	41	1266	0600.10.05.84 - 0600.20.05.84	0600.10.05.84 - 1200.22.03.85	
	730	1266	1266	0600.10.05.84 - 1200.22.03.85	0600.10.05.84 - 1200.22.03.85	
MOORING 5 South Offshore						
IV/V	50	1141	1547	0000.10.02.83 - 0000.22.11.83	0000.10.02.83 - 1200.02.03.84	VTPBridge
	100	1540	1578	0000.10.02.83 - 1800.29.02.84	1800.09.02.83 - 1200.19.05.83	VTPBridge
	390	1334	1334	0000.10.02.83 - 0600.09.01.84	0000.13.06.83 - 0600.03.04.84 0000.10.02.83 - 0600.09.01.84	VTPBridge

PERIOD	INSTRUMENT DEPTH [m]	DATA U,V	POINTS T	VELOCITY RECORD DATES (UT)	TEMPERATURE RECORD DATES (UT)	COMMENTS
MOORING 10 South Shelf						
I	50	454	454	0000.23.11.81 - 0600.16.03.82	0000.23.11.81 - 0600.16.03.82	
	100	453	453	0000.23.11.81 - 0000.16.03.82	0000.23.11.81 - 0000.16.03.82	
II	51	990	990	0000.19.03.82 - 0600.21.11.82	0000.19.03.82 - 0600.21.11.82	
	101	990	990	0000.19.03.82 - 0600.21.11.82	0000.19.03.82 - 0600.21.11.82	
III	50	219		0000.24.11.82 - 1200.17.01.83	TEMPERATURE OFFSCALE	
	101	212	179	0000.24.11.82 - 1800.15.01.83	0000.24.11.82 - 1200.07.01.83	
IV	58	841	1119	1800.15.02.83 - 1800.13.09.83	1800.15.02.83 - 0600.22.11.83	
	109	1119	1119	1800.15.02.83 - 0600.22.11.83	1800.15.02.83 - 0600.22.11.83	
VI	50	1248	1248	1800.06.05.84 - 1200.14.03.85	1800.06.05.84 - 1200.14.03.85	
	100	1248	972	1800.06.05.84 - 1200.14.03.85	1800.06.05.84 - 1800.20.07.84 0000.28.09.84 - 1200.14.03.85	

MOORING 10 South Inner Slope

V	100	640	640	0000.25.11.83 - 1800.02.05.84	0000.25.11.83 - 1800.02.05.84	
	150	639	639	0000.25.11.83 - 1200.02.05.84	0000.25.11.83 - 1200.02.05.84	
	275	639	639	0000.25.11.83 - 1200.02.05.84	0000.25.11.83 - 1200.02.05.84	
	425	640	640	0000.25.11.83 - 1800.02.05.84	0000.25.11.83 - 1800.02.05.84	
VI	82	1251	1251	0000.06.05.84 - 1200.14.03.85	0000.06.05.84 - 1200.14.03.85	
	132	1021	1251	0000.06.05.84 - 0000.16.01.85	0000.06.05.84 - 1200.14.03.85	
	257	482	956	0000.06.05.84 - 0600.03.09.84	0000.06.05.84 - 1800.30.12.84	
	407	1251	1251	0000.06.05.84 - 1200.14.03.85	0000.06.05.84 - 1200.14.03.85	
	707	1251	1251	0000.06.05.84 - 1200.14.03.85	0000.06.05.84 - 1200.14.03.85	

PERIOD	INSTRUMENT	DATA POINTS		VELOCITY RECORD	TEMPERATURE RECORD	COMMENTS
	DEPTH [m]	U,V	T	DATES (UT)	DATES (UT)	

MOORING 10 South Outer Slope

I	87	451	451	0000.23.11.81 - 1200.15.03.82	0000.23.11.81 - 1200.15.03.82	
	138	449	449	0600.23.11.81 - 0600.15.03.82	0600.23.11.81 - 0600.15.03.82	
	282	449	449	0600.23.11.81 - 0600.15.03.82	0600.23.11.81 - 0600.15.03.82	
	412	449	449	0600.23.11.81 - 0600.15.03.82	0600.23.11.81 - 0600.15.03.82	
II	169	989	989	0600.18.03.82 - 0600.20.11.82	0600.18.03.82 - 0600.20.11.82	
	299	989	989	0600.18.03.82 - 0600.20.11.82	0600.18.03.82 - 0600.20.11.82	
	442	989	989	0600.18.03.82 - 0600.20.11.82	0600.18.03.82 - 0600.20.11.82	
III	390	333	333	0600.23.11.82 - 0600.14.02.83	0600.23.11.82 - 0600.14.02.83	
IV	90	1123	1123	0000.17.02.83 - 1200.24.11.83	0000.17.02.83 - 1200.24.11.83	
	140	1123	1123	0600.17.02.83 - 1800.24.11.83	0600.17.02.83 - 1800.24.11.83	
	265	778	1123	0000.03.05.83 - 1800.11.05.83	0000.17.02.83 - 1200.24.11.83	
	415	949	946	0600.23.05.83 - 1200.24.11.83	0000.17.02.83 - 1200.24.11.83	
V				0000.17.02.83 - 1800.13.07.83	0000.17.02.83 - 1200.14.07.83	
				0600.15.08.83 - 1800.21.08.83	1200.16.08.83 - 1800.21.08.83	
				0600.02.09.83 - 1200.24.11.83	1200.02.09.83 - 1200.24.11.83	
	84	627	627	1800.27.11.83 - 0600.02.05.84	1800.27.11.83 - 0600.02.05.84	
VI	134	627	627	1800.27.11.83 - 0600.02.05.84	1800.27.11.83 - 0600.02.05.84	
	279	627	627	1800.27.11.83 - 0600.02.05.84	1800.27.11.83 - 0600.02.05.84	
	79	1230	1254	0000.05.05.84 - 0600.08.03.85	0000.05.05.84 - 0600.14.03.85	
	130	1254	1254	0000.05.05.84 - 0600.14.03.85	0000.05.05.84 - 0600.14.03.85	
	250	1254	1254	0000.05.05.84 - 0600.14.03.85	0000.05.05.84 - 0600.14.03.85	
	400	1254	1254	0000.05.05.84 - 0600.14.03.85	0000.05.05.84 - 0600.14.03.85	

VBridge

MOORING 10 South Offshore

IV	110	336	1118	0000.18.02.83 - 1800.12.05.83	0000.18.02.83 - 0600.24.11.83	
	160	1118	1118	0000.18.02.83 - 0600.24.11.83	0000.18.02.83 - 0600.24.11.83	
	275	1118	1118	0000.18.02.83 - 0600.24.11.83	0000.18.02.83 - 0600.24.11.83	
	415	1118	1118	0000.18.02.83 - 0600.24.11.83	0000.18.02.83 - 0600.24.11.83	

PERIOD	INSTRUMENT DEPTH [m]	DATA U,V	POINTS T	VELOCITY RECORD DATES (UT)	TEMPERATURE RECORD DATES (UT)	COMMENTS
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MOORING 85 West

IV	175	1129	1129	0600.08.02.83 - 0600.17.11.83	0600.08.02.83 - 0600.17.11.83	
	225	1129	1129	0600.08.02.83 - 0600.17.11.83	0600.08.02.83 - 0600.17.11.83	
	360	1129	1129	0600.08.02.83 - 0600.17.11.83	0600.08.02.83 - 0600.17.11.83	
	510	1129	1129	0600.08.02.83 - 0600.17.11.83	0600.08.02.83 - 0600.17.11.83	
V	107	690	690	0000.20.11.83 - 0600.10.05.84	0000.20.11.83 - 0600.10.05.84	VBridge
	157	690	690	0000.20.11.83 - 0600.10.05.84	0000.20.11.83 - 0600.10.05.84	
	282	690	690	0000.20.11.83 - 0600.10.05.84	0000.20.11.83 - 0600.10.05.84	
	418	690	690	0000.20.11.83 - 0600.10.05.84	0000.20.11.83 - 0600.10.05.84	VBridge
VI	56	455	1259	0000.13.05.84 - 1800.19.08.84	0000.13.05.84 - 1200.23.03.85	
				0000.09.03.85 - 1200.23.03.85		
	107	627	1259	0000.13.05.84 - 1800.17.09.84	0000.13.05.84 - 1200.23.03.85	
				0000.23.02.85 - 1200.23.03.85		
	232	1259	1259	0000.13.05.84 - 1200.23.03.85	0000.13.05.84 - 1200.23.03.85	
	379		1258	DIRECTION SENSOR FAILED	0000.13.05.84 - 0600.23.03.85	

MOORING 2 South

II	51		153	SPEED SENSOR FAILED	0600.28.03.82 - 0600.05.05.82	
	101	151	151	0600.28.03.82 - 1800.04.05.82	0600.28.03.82 - 1800.04.05.82	
	250	985	985	0600.28.03.82 - 0600.29.11.82	0600.28.03.82 - 0600.29.11.82	VTPBridge
	405	985	985	0600.28.03.82 - 0600.29.11.82	0600.28.03.82 - 0600.29.11.82	VTPBridge

DEEP and INTERMEDIATE
MOORING

SHALLOW MOORING

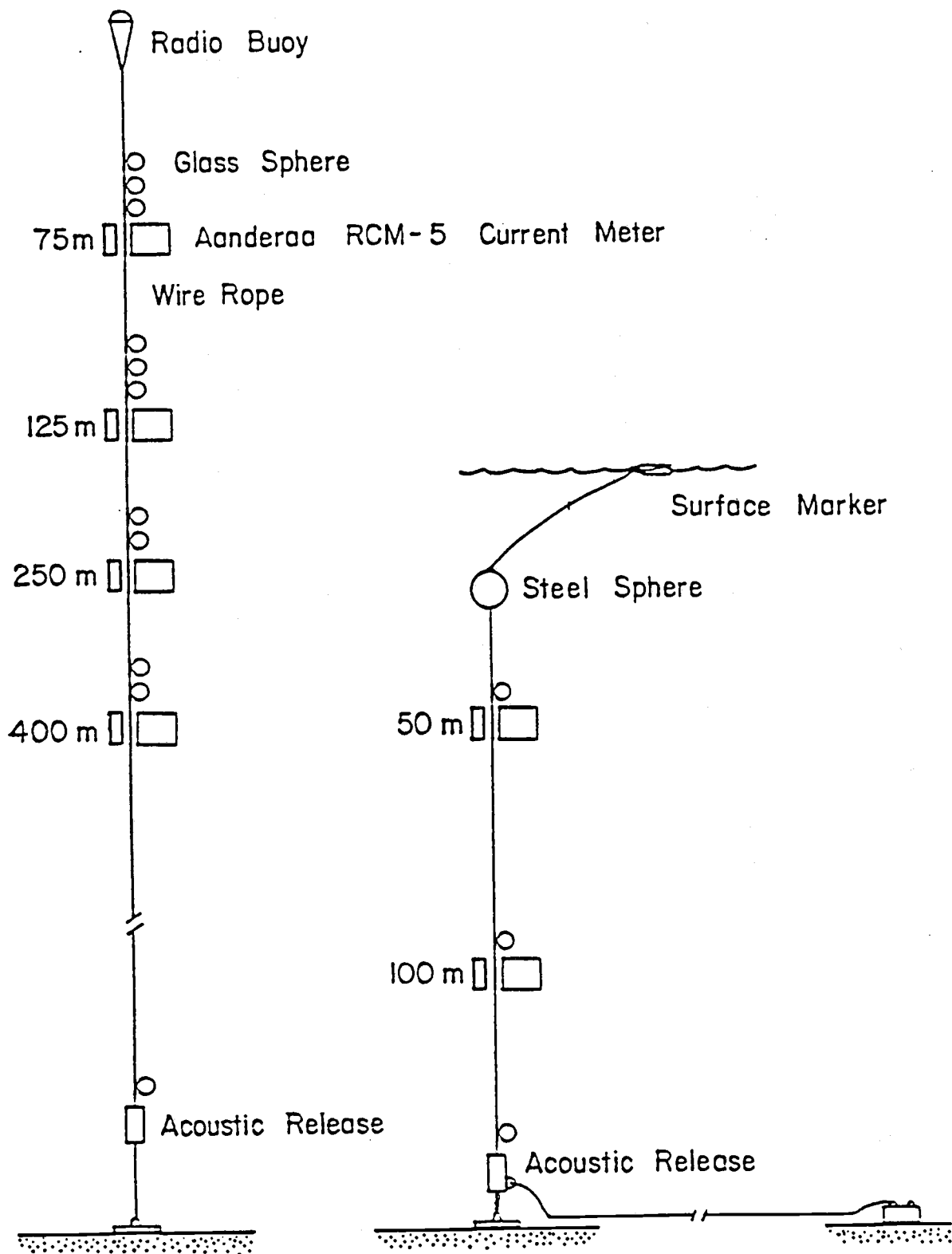


Figure 3. Mooring schematics for the deep and intermediate moorings over and beyond the continental slope (left) and for the shallow moorings over the continental shelf (right).

instruments at 50 and 100 m, the slope and offshore moorings had instruments at nominal depths of 75, 125, 250 and 400 m (Figure 3). The shelf mooring design was similar to the mooring design presented by Pillsbury et al. (1969); the deeper slope and offshore moorings were similar to the intermediate mooring design of Heinmiller and Walden (1973). The instrument depths were chosen after reviewing the studies of Brockman et al. (1980), Brink et al. (1980) and Romea and Smith (1983), which showed that both the undercurrent and propagating motions were strongest at 100 meters and negligible at 400 meters.

DATA PROCESSING

All moorings consisted of Aanderaa RCM 4 or RCM 5 current meters equipped to record speed, direction, temperature and pressure. Data from the current meter tapes are translated into bit numbers and each data record is assigned a time in Universal Coordinated Time (UCT). This product is known as the dated, raw file. The sensors are routinely calibrated before and after deployment. The dated raw file, together with the calibration information, is then processed into engineering units. Smith et al. (1986) reviewed the calibration procedures used with the Aanderaa current meters. The speed record is based on the rotor count during the sampling interval. When a zero occurs in a speed record, it is replaced by 0.8 cm s^{-1} since the nominal threshold of the sensor is 1.5 cm s^{-1} . Direction, temperature, and pressure are instantaneous measurements made at the end of the sampling interval. During the first and third deployment periods, the sampling interval was thirty minutes; for the remainder of the study, it was one hour. The time series were filtered using a Cosine-Lanczos Filter with $1/2$

amplitude at 40 hours and 1/2 power at 46.6 hours. The filtered time series were decimated to 6 hourly data.

DETERMINATION OF METER DEPTH

The intended depths of the current meters at the two shelf locations were 50 and 100 meters; at the slope and offshore locations the intended depths were 75, 125, 250, and 400 meters. Mooring wire lengths were based on the intended bottom depths and intended meter depths. The depths are assigned after examination of the pressure, speed and direction record for the following factors: initial mooring adjustment, mooring tilt during high currents and line stretch. The value finally assigned represents our best estimate of the most common depth of the current meter when the mooring has minimum tilt. The depths of instruments without pressure sensors are computed using the nearest meter with a pressure sensor and the intended mooring wire lengths.

QUALITY CONTROL

The records were carefully scrutinized for quality. Several common problems affecting data quality occurred throughout the study:

- 1) Biological growth on rotors (i.e., fouling)

This problem generally occurred on the shallowest meters at the end of the mooring period. Upon recovery the amount of growth on the rotor, the rotor cage, and any associated equipment was noted to alert the processor to the possibility of effects on the speed records. In the data record the effect of fouling is noticeable as persistent abnormally low speeds. The affected speed records were truncated to remove these values. The

directional data, which is obtained from the orientation of the current meter, was not affected by fouling since the applied torque apparently kept the gimbals clean.

2) Fishing or fishbite

Some moorings were recovered with fishing line tangled around the rotors and vanes. In other cases, the upper portion of deep moorings were missing, which caused a change in total buoyancy of the remaining instruments.

3) Measurement exceeds limit of sensor

On some meters the range of the temperature sensors was not sufficient to record the abnormally warm temperatures which developed during the array deployment in place at the onset of the 1982-83 El Niño. In these records the off-scale points are evident in the dated raw file as a repetition or occurrence of the highest bit value. These points were deleted from the record. Occasionally a pressure sensor with an inappropriate range for the depth of the mooring was used resulting in offscale values.

4) Intermittent instrument failure

Temporary failures of the sensors or recording mechanisms occurred on several occasions. Sometimes the causes of these failures are apparent: the mooring being hit or dragged by fisherman, dirty encoders, sticky tapes. These problems often appear in the data as repeated bit numbers, isolated spikes, or short runs of unexplainably erratic data. Problem areas of only a few cycles are corrected by linear interpolation; those longer than a few hours are bridged. The data gaps were bridged using Anderson's (1974)

algorithm for a predictive filter which utilizes the spectral characteristics of the preceding data (Smylie et al., 1973; Ulrych et al., 1973).

In this report all questionable data have been eliminated. In general the data gaps of a few days or less are filled and those of greater duration are left as missing values.

ACKNOWLEDGEMENTS

We are appreciative of the assistance and cooperation given by the masters and crews of the R/V WECOMA, R/V ENDEAVOR, R/V RESEARCHER and R/V DISCOVERER and by our seagoing colleagues and companions on the deployment and recovery cruises. We wish to thank the members of the OSU Buoy Group, especially Ben Moore and Dennis Barstow for their diligence and care in the preparation, deployment and recovery of the current meters. We are grateful to Ants Leetmaa, Dave Halpern and Don Hansen for making possible the use of the NOAA vessels and for loans of equipment. Thank you to Jane Fleischbein for her artistic contributions and to Joseph Bottero, Priscilla Newberger, Dennis Root and Phyllis Stabeno for their contributions to the programs used in this report.

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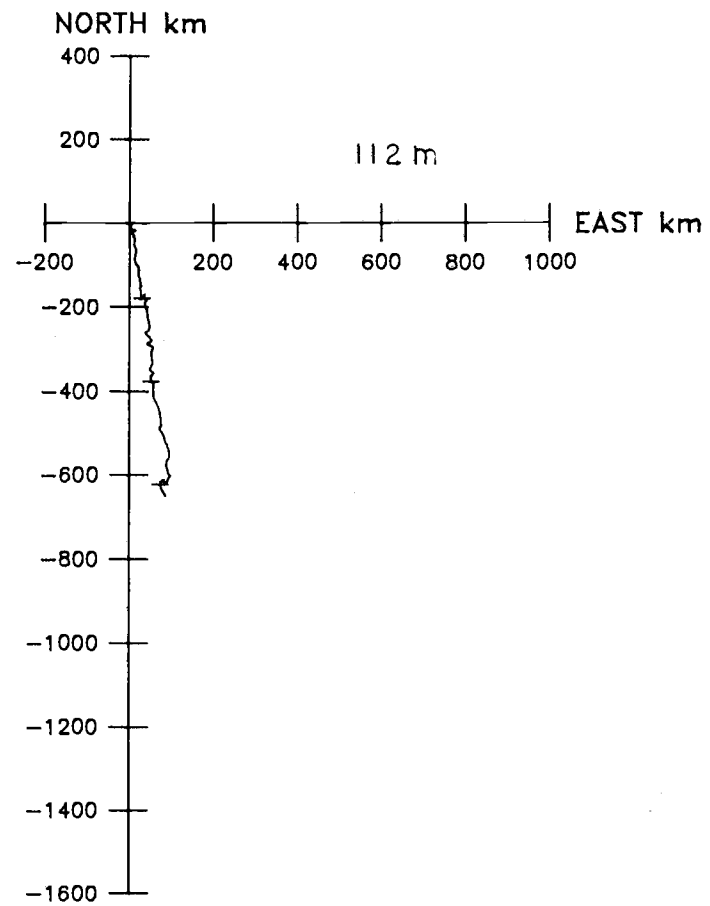
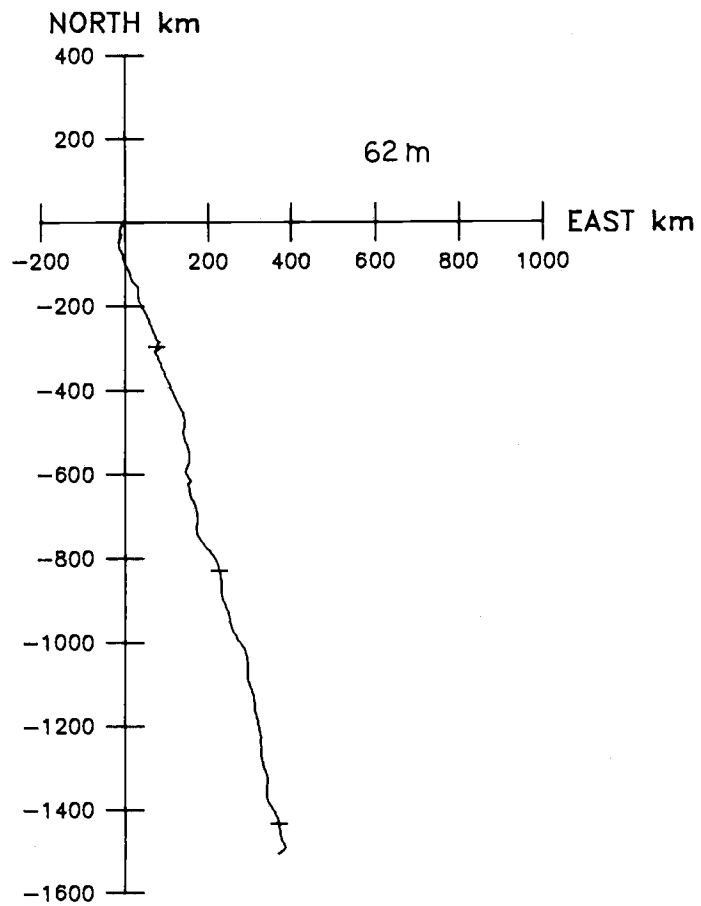
DATA PRESENTATION

The data are organized by mooring location: 5°S shelf, 5°S slope, 5°S offshore, 10°S shelf, 10° inner slope, 10°S outer slope, 10°S offshore, 85°W, and 2°S. For each mooring a statistical page shows the means and standard deviations of the eastward (u) and northward (v) component of the current and the temperature during the different observation periods. The minimum and maximum value of temperature during each observation period is also presented. The statistical page shows vector means of speed and direction as well as the principal axes, i.e., the direction of maximum variance (Kundu and Allen, 1976) which is given in degrees clockwise from true North. For each current meter the following plots of the 6-hourly filtered data sets are presented: progressive vector diagrams, stick plots and temperature time series, time series of the eastward (u) and northward (v) component, time series of pressure and histograms of speed, direction and temperature.

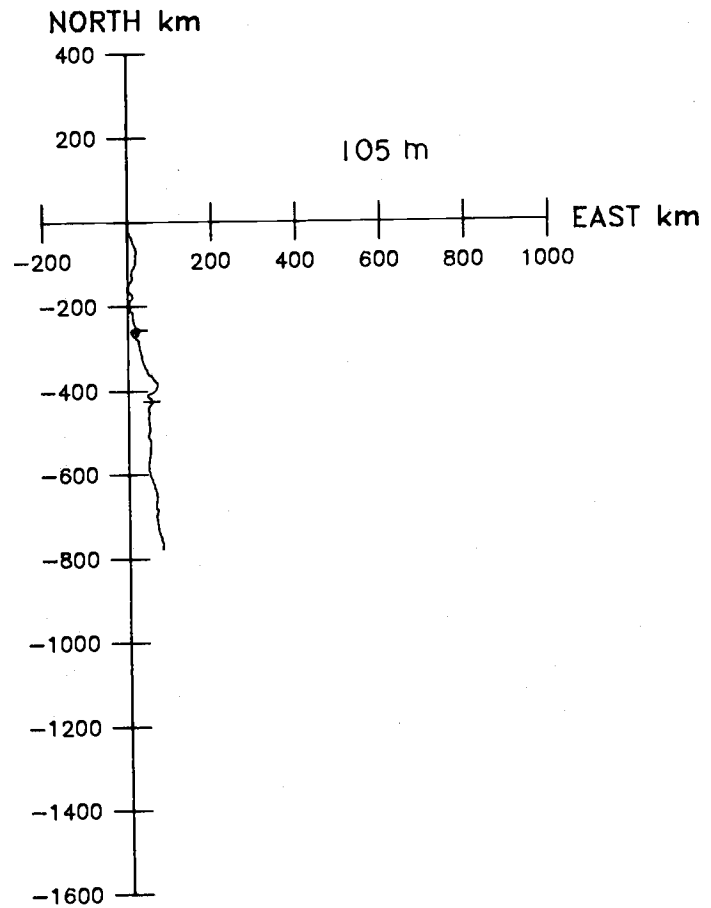
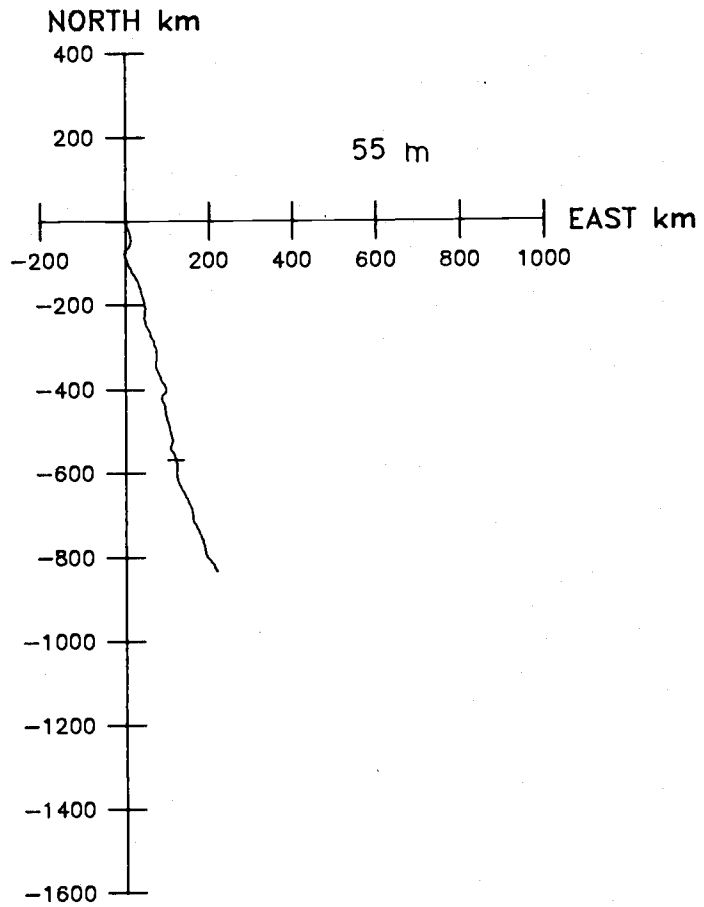
MOORING 5 SOUTH SHELF

MOORING 5 South Shelf

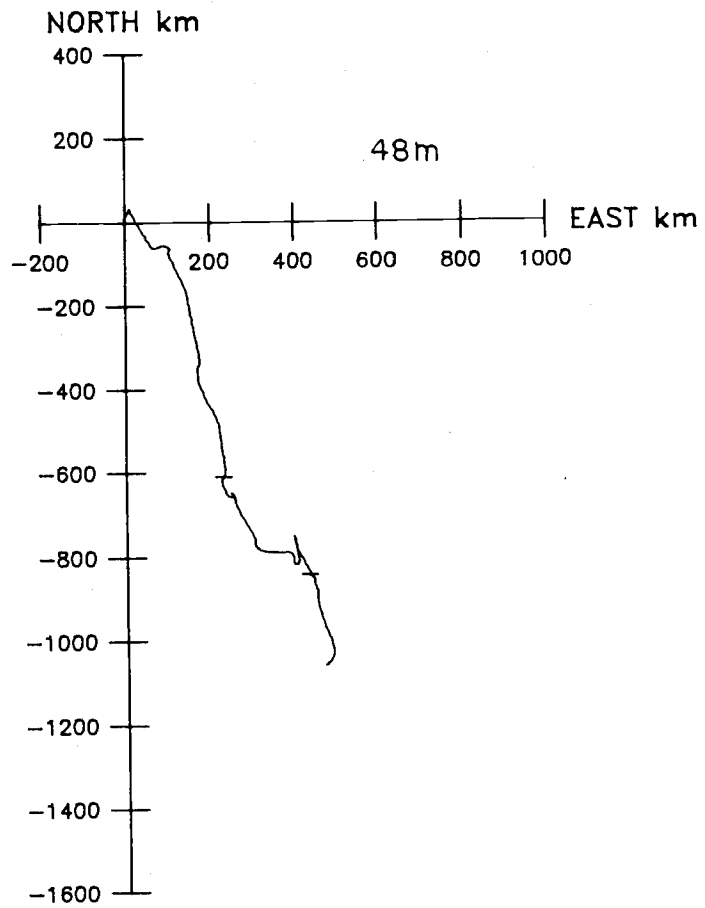
PERIOD	INSTRUMENT DEPTH [m]	DATA U,V	POINTS T	MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
				U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED	DIRECTION	AXIS
							[Deg.C]		[cm/s]	[Deg.T]	[Deg.T]
I	62	378	378	4.5 (6.9)	-18.4 (10.1)	15.51 (0.73)	14.39	16.89	19.0	166.2	-26.6
	112	378	378	1.1 (4.6)	-8.0 (7.1)	14.72 (0.53)	14.02	16.03	8.1	172.4	-9.6
II	55	180	1059	5.6 (6.9)	-21.5 (9.2)	17.70 (1.93)	15.04	23.14	22.2	165.3	-28.4
	105	358	1059	1.0 (5.0)	-10.1 (7.7)	16.46 (1.65)	14.55	21.59	10.1	174.1	-3.4
III	48	281		7.8 (9.6)	-17.5 (20.5)				19.1	156.0	-14.0
IV	55	1127	1127	3.0 (6.1)	-4.1 (15.0)	21.67 (4.81)	15.27	29.62	5.1	143.3	-15.9
	110	977	1127	2.4 (5.3)	-4.1 (12.9)	17.18 (1.77)	14.22	22.87	4.8	150.1	-13.2
V	53	537	678	3.0 (5.0)	-3.8 (9.8)	15.72 (0.76)	14.53	17.60	4.8	141.9	-12.8
	103	397	678	2.4 (4.6)	-2.4 (7.1)	14.82 (0.63)	13.43	16.16	3.4	134.4	-8.1



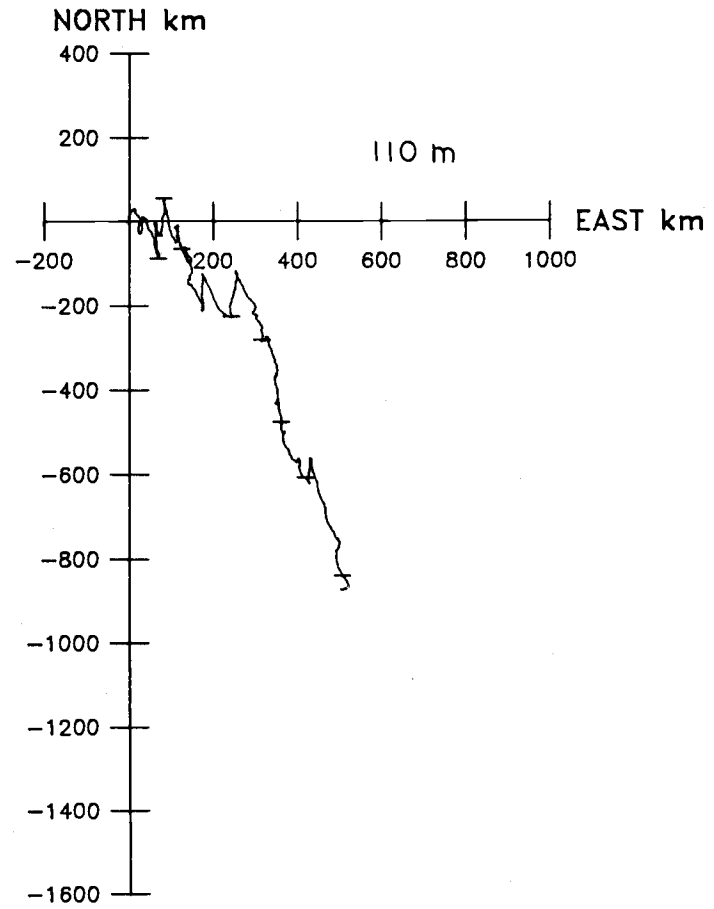
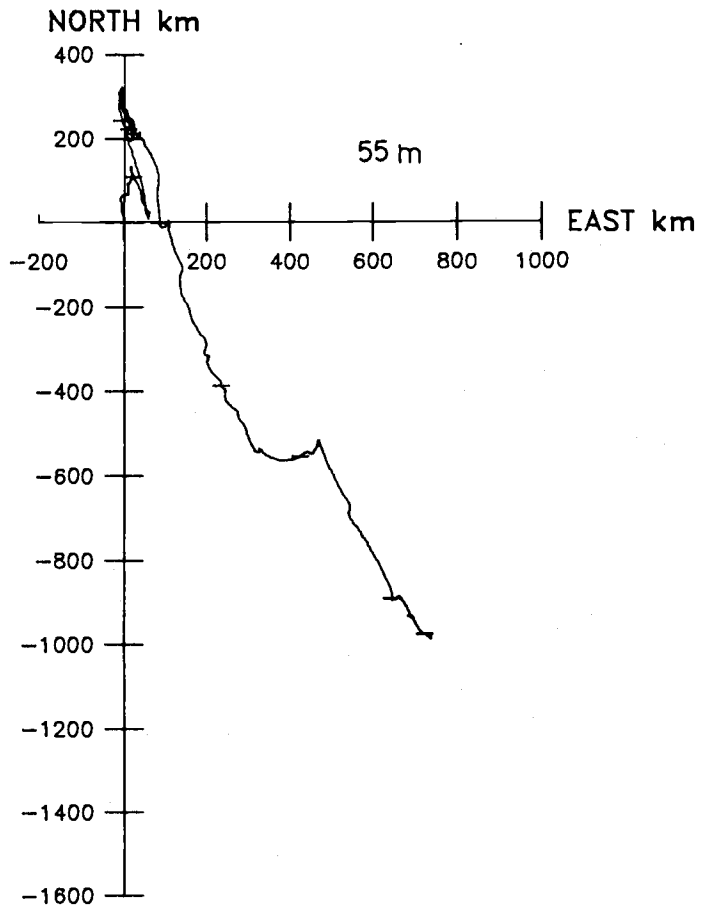
5 South Shelf Period I



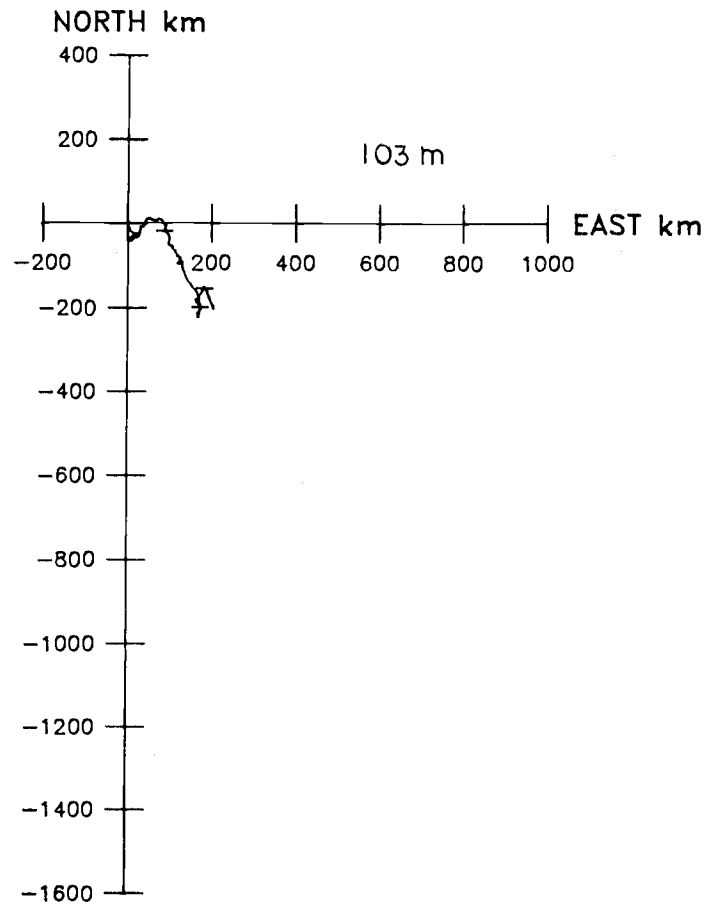
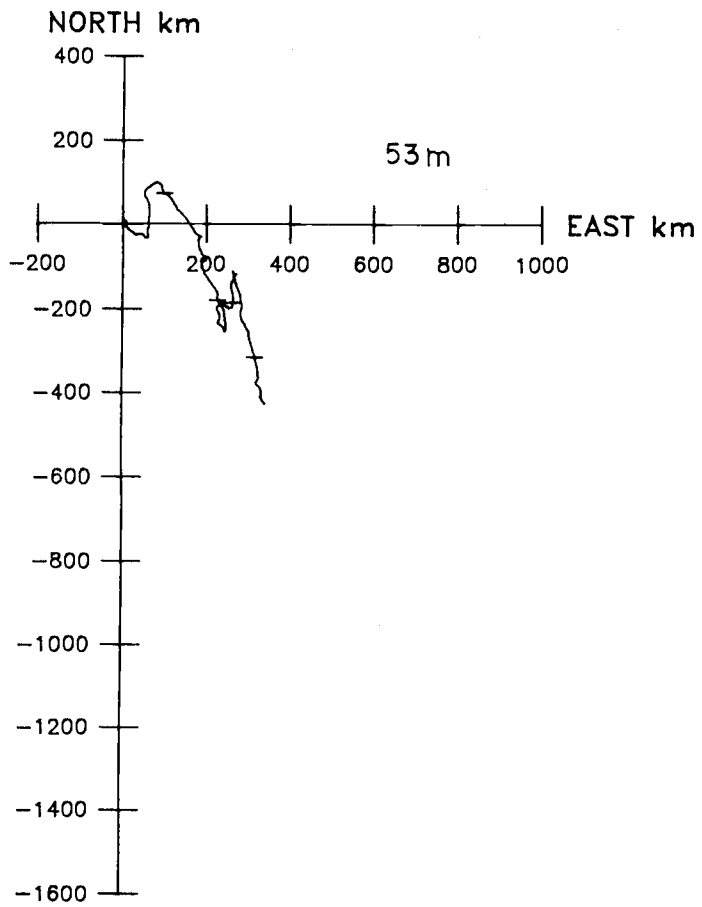
5 South Shelf Period II



5 South Shelf Period III

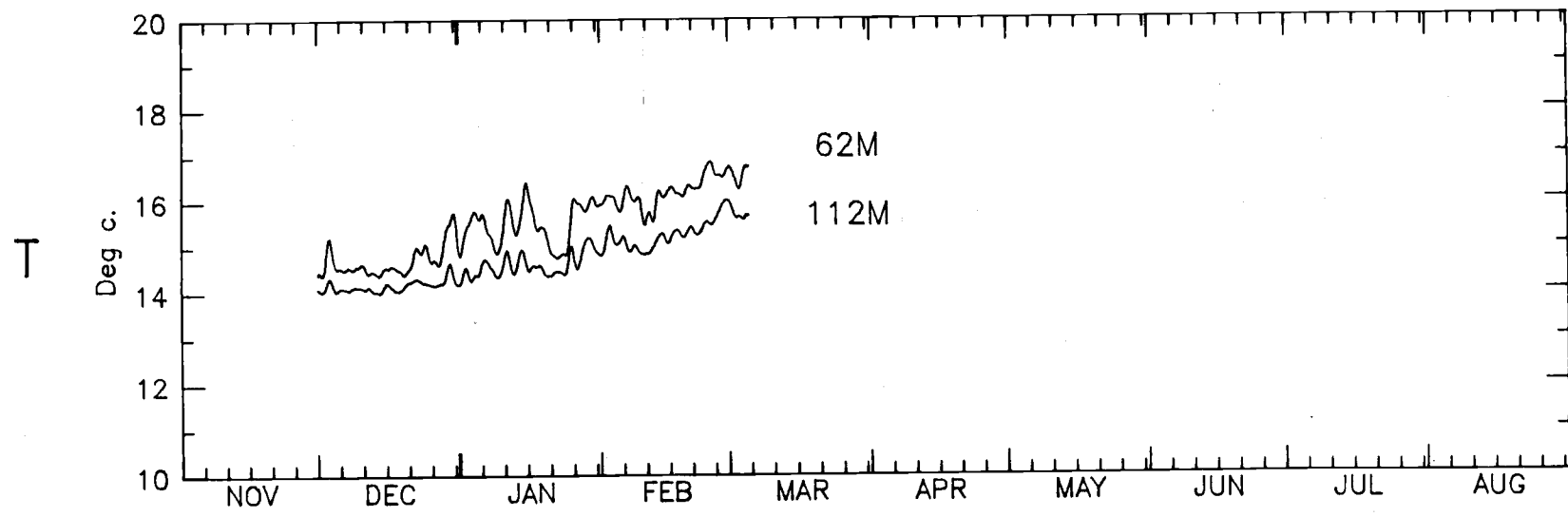
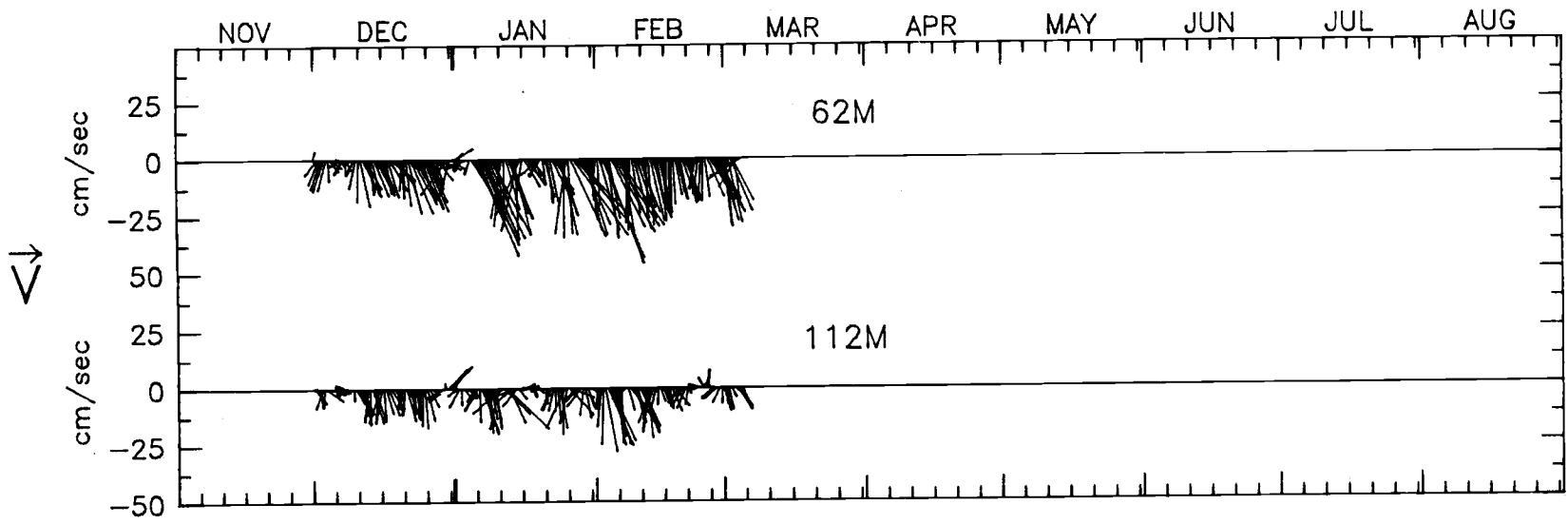


5 South Shelf Period IV



5 South Shelf Period V

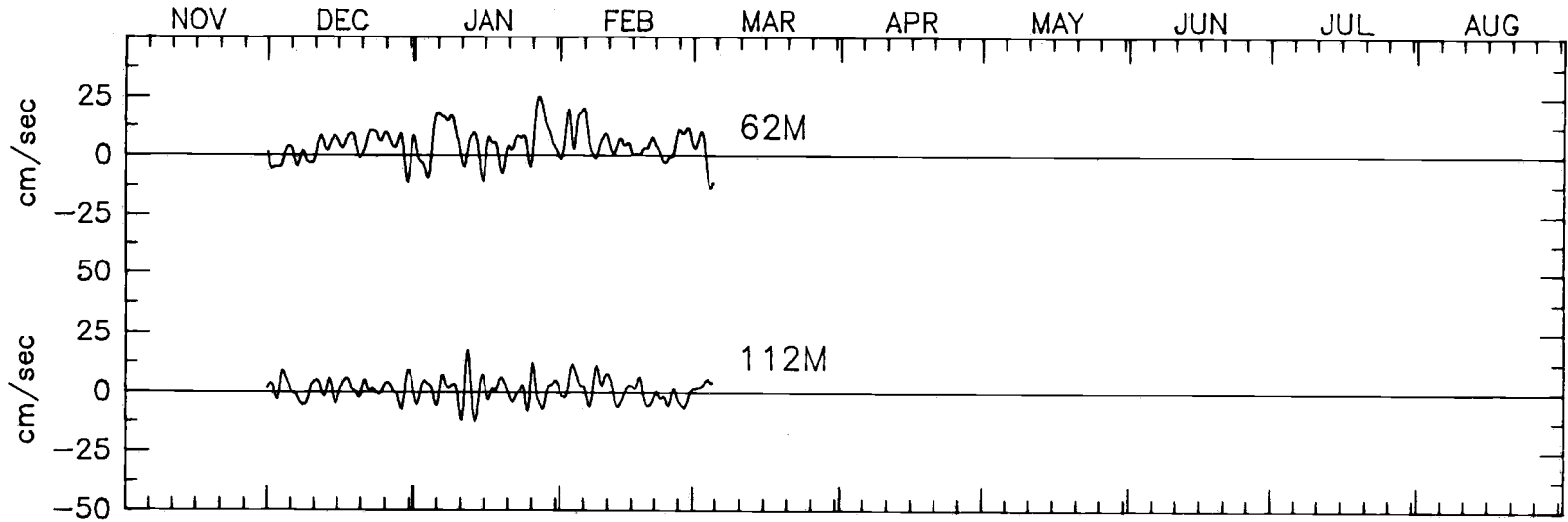
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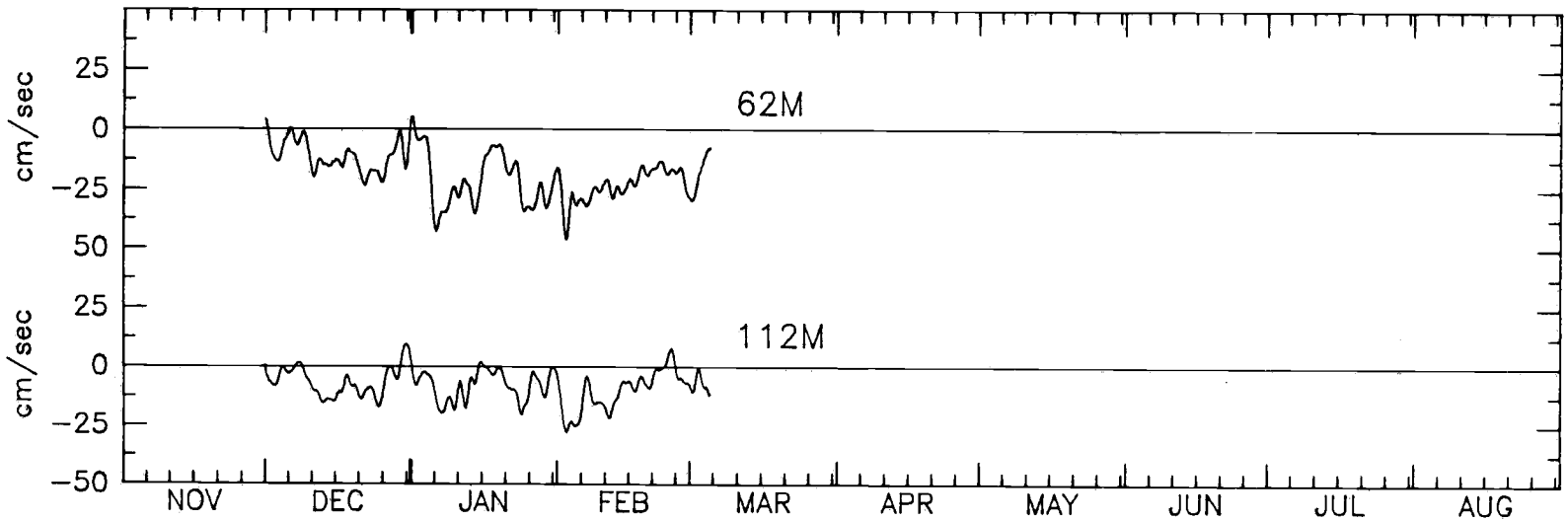
5 South Shelf Period I

1982

U

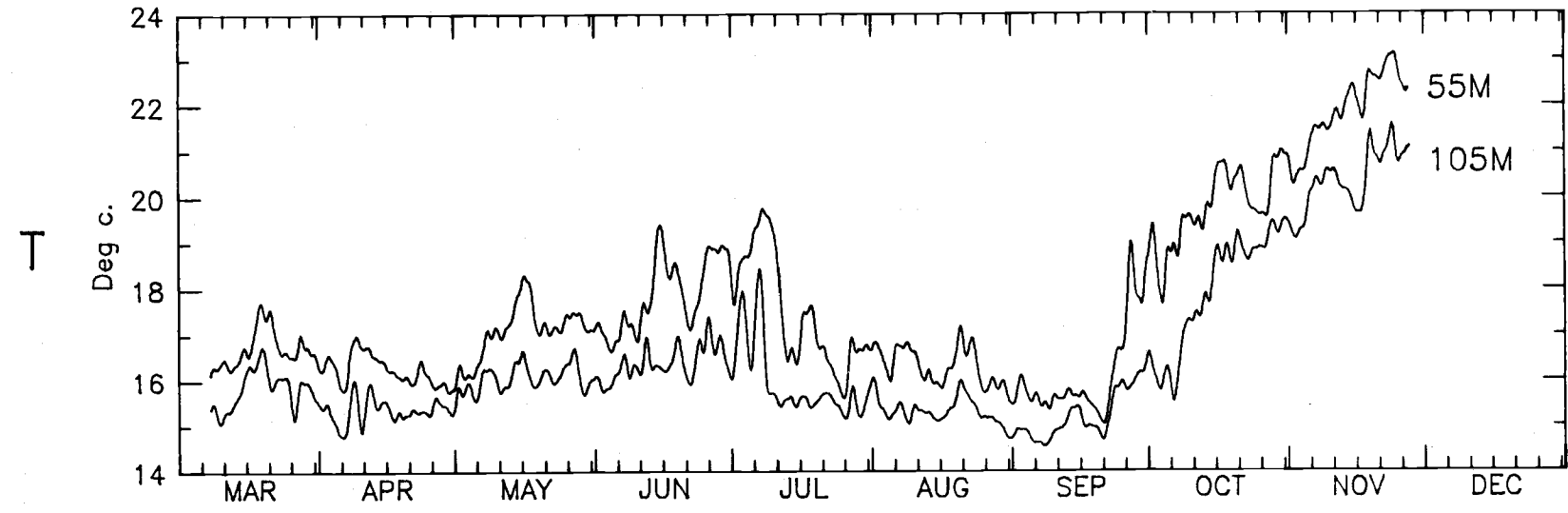
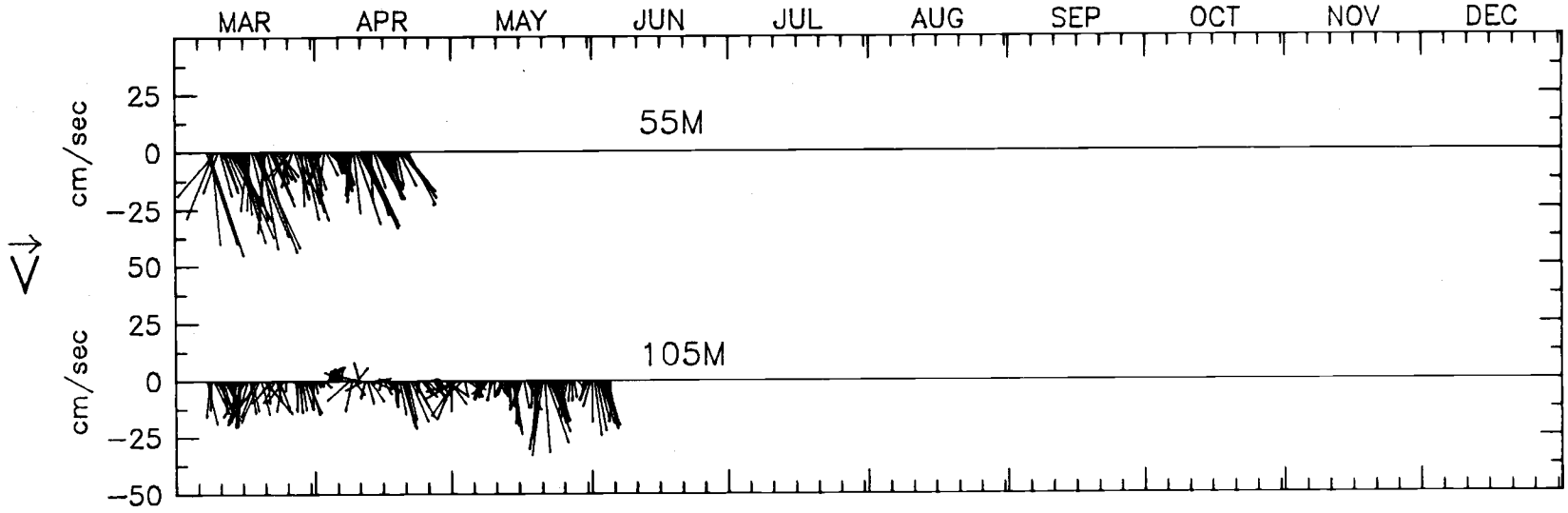


V



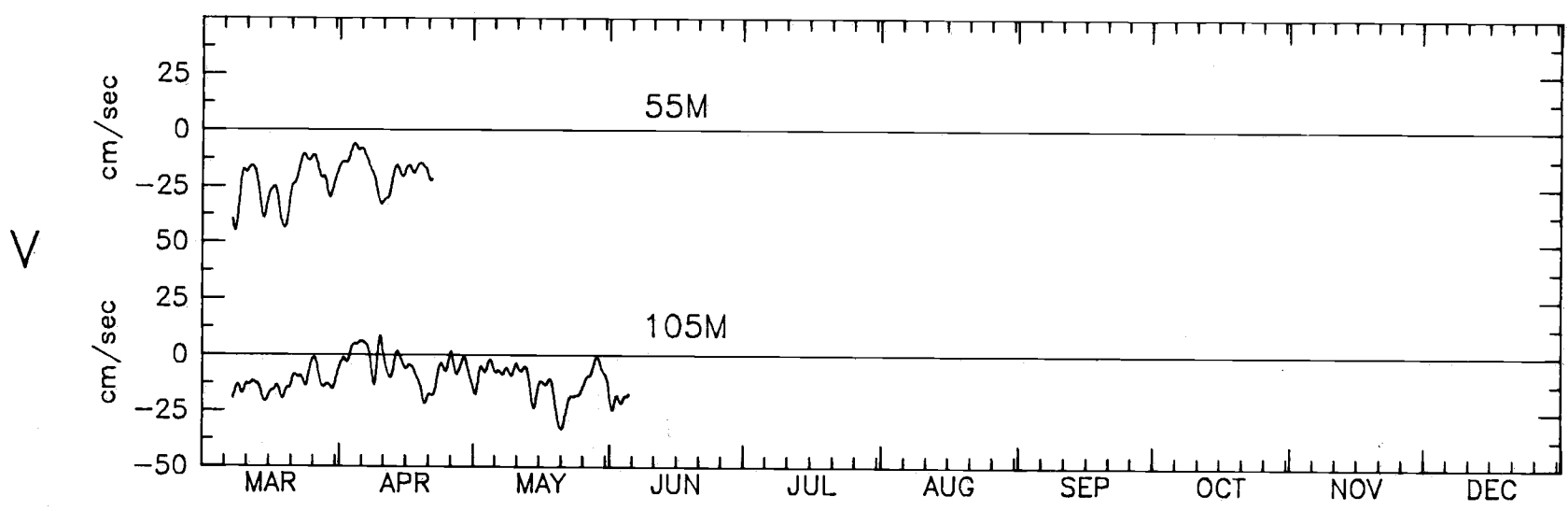
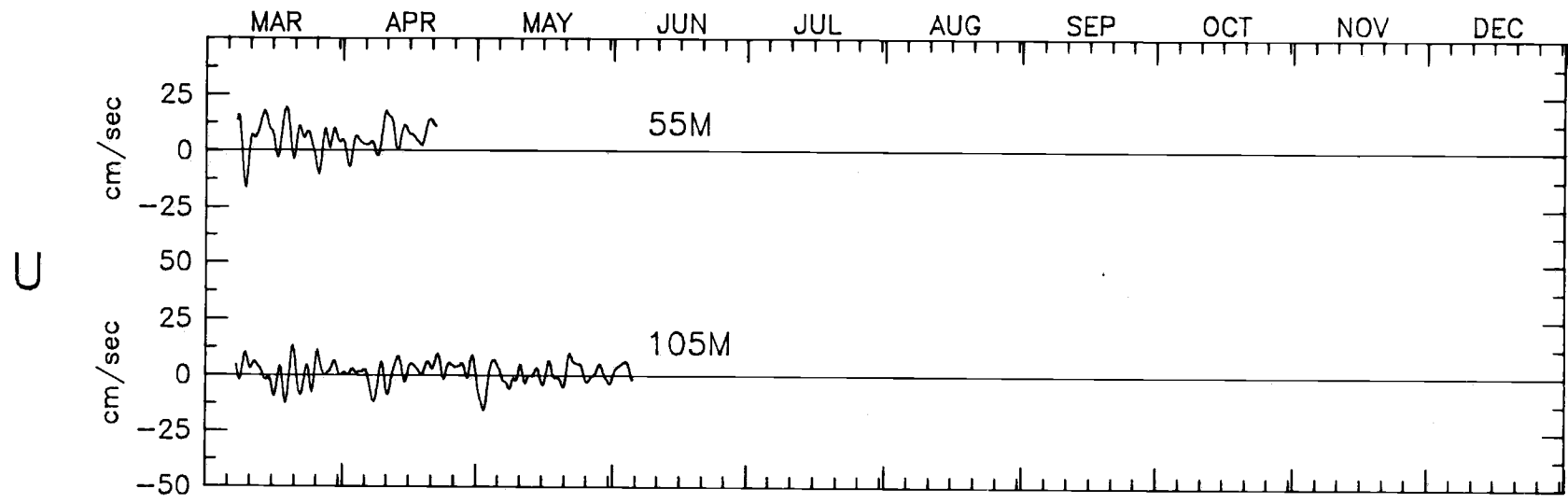
5 South Shelf Period I

1982

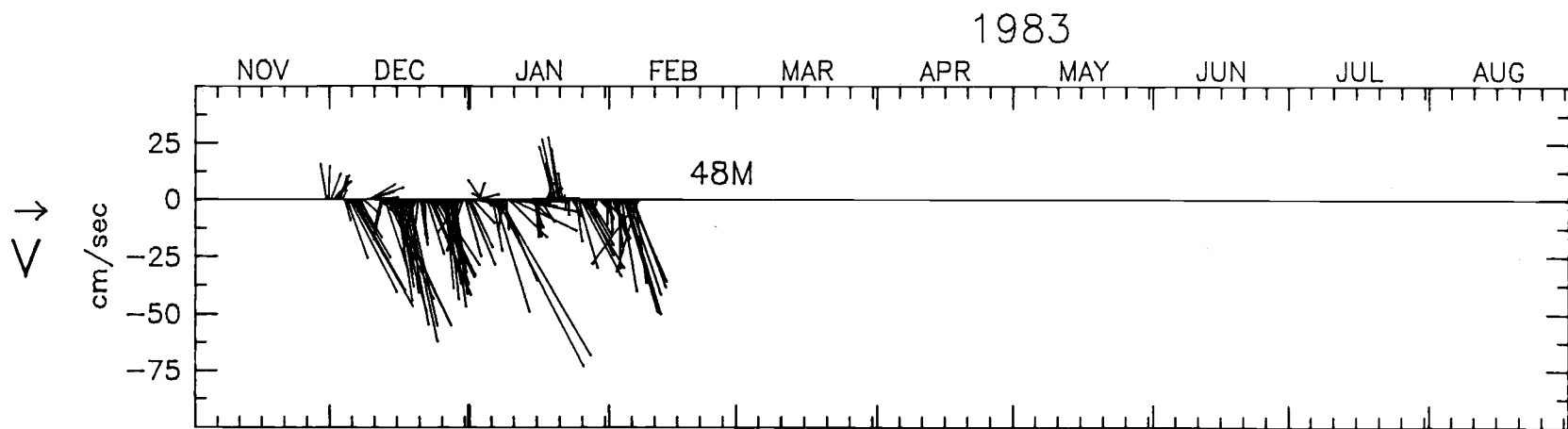


5 South Shelf Period II

1982

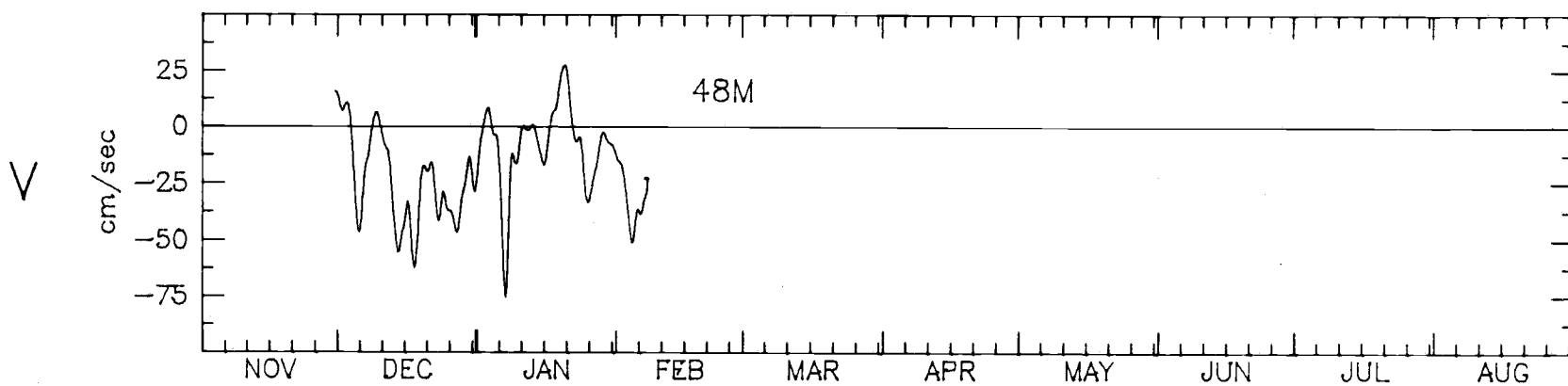
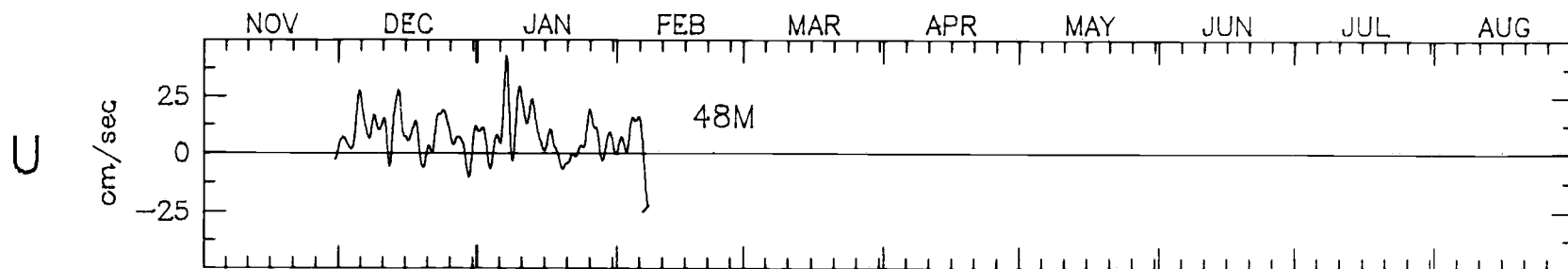


5 South Shelf Period II

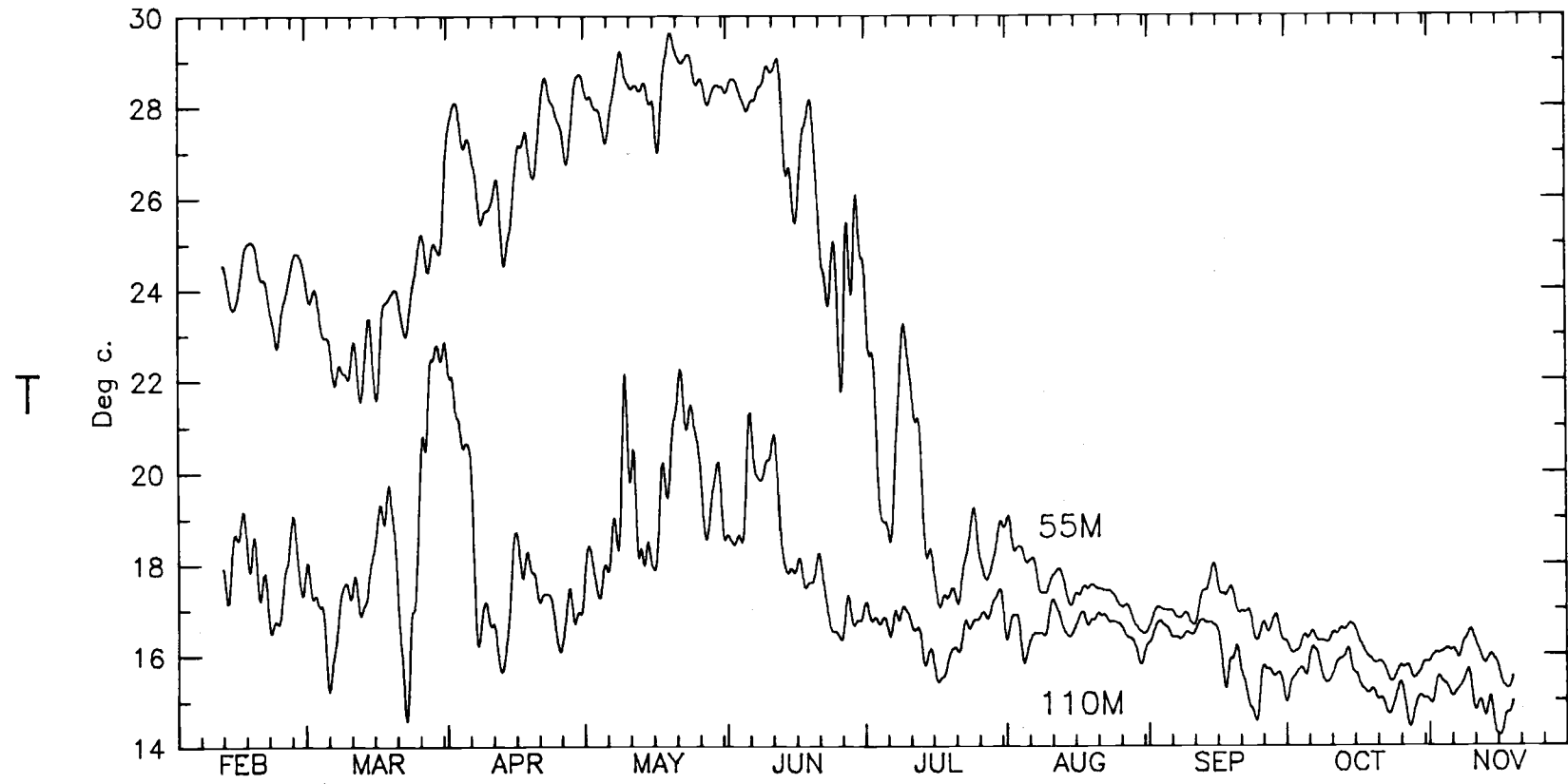
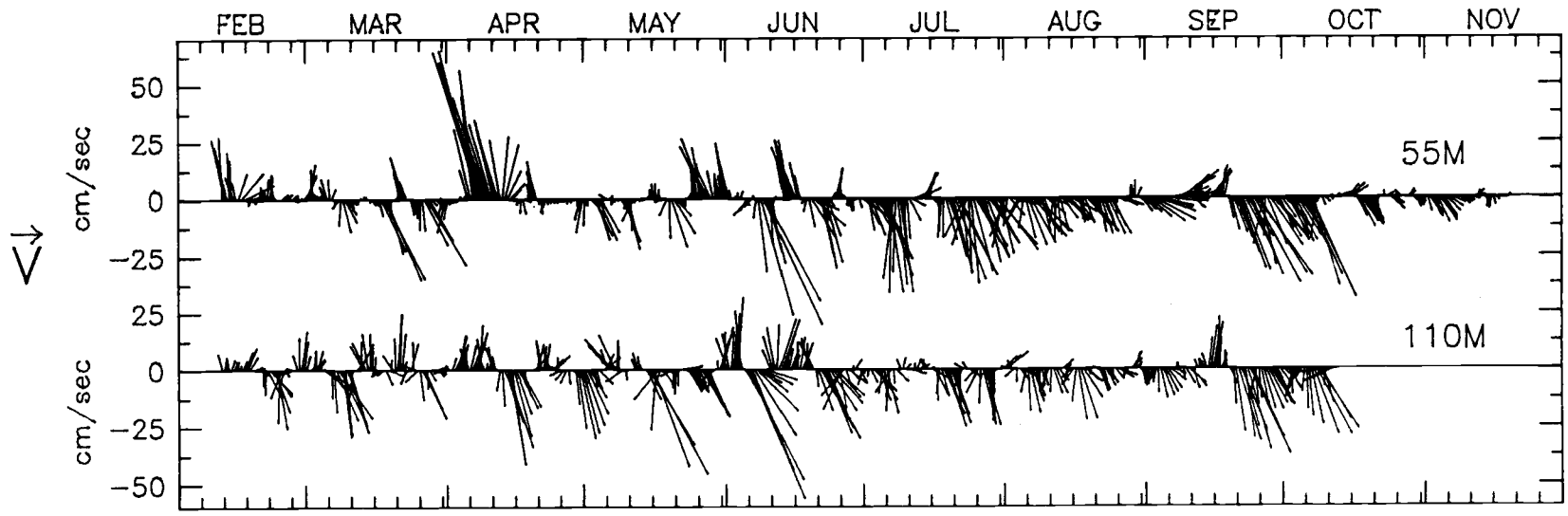


5 South Shelf Period III

1983

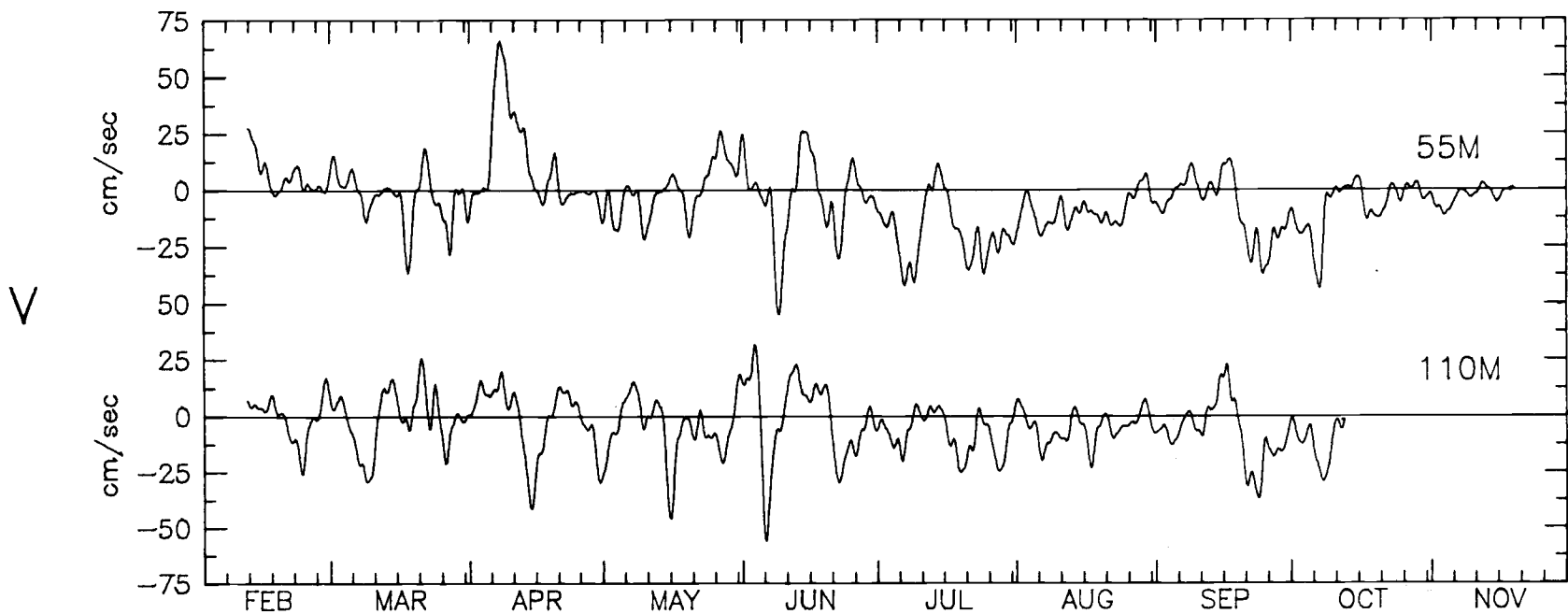
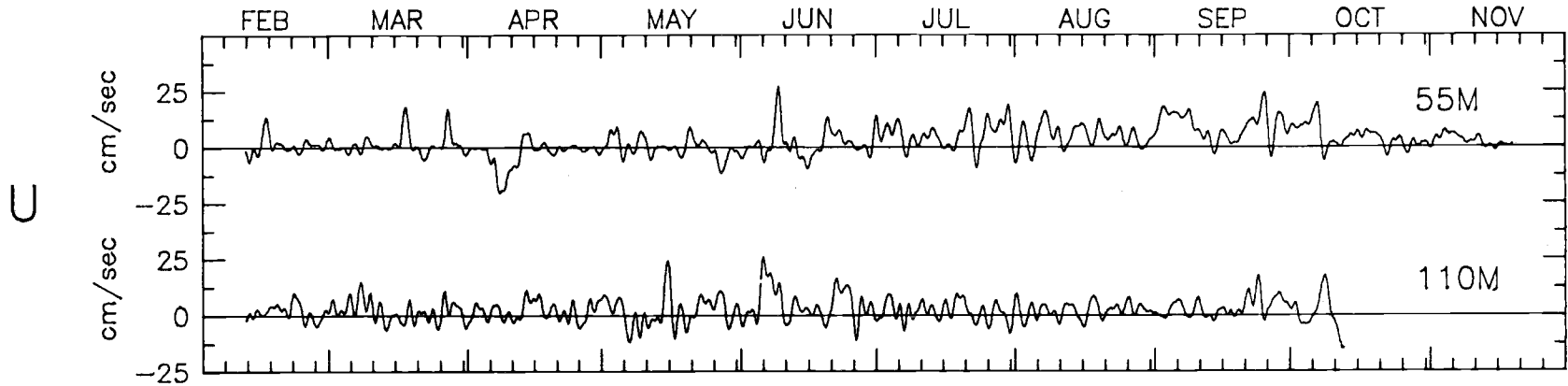


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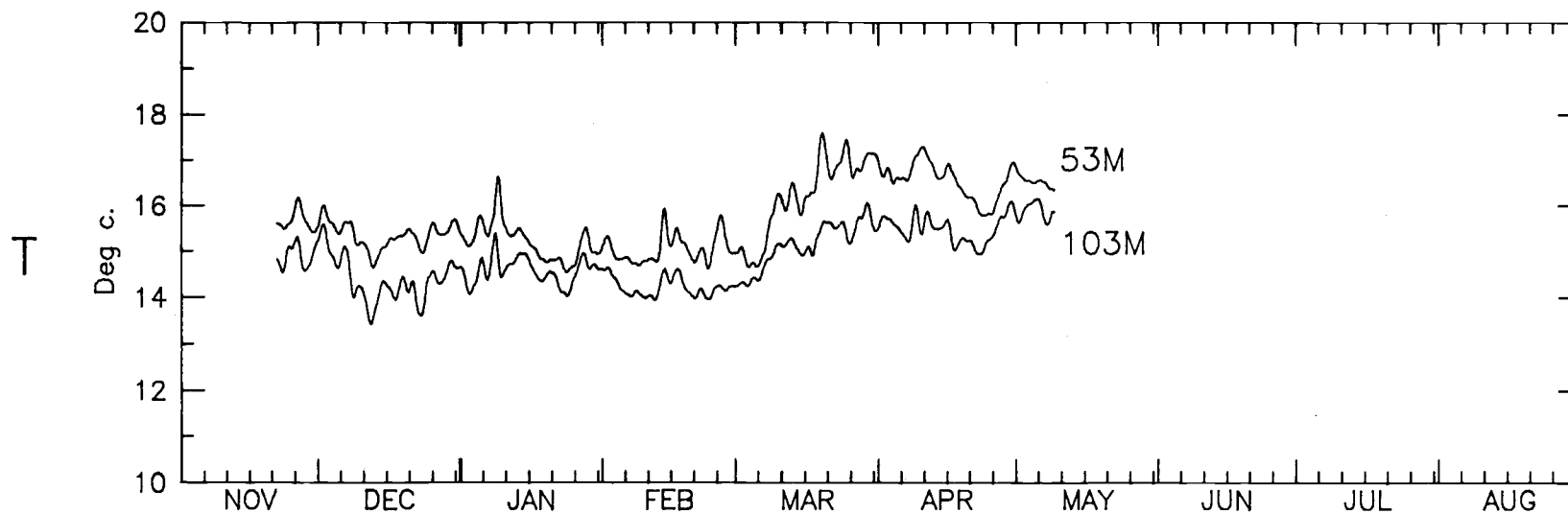
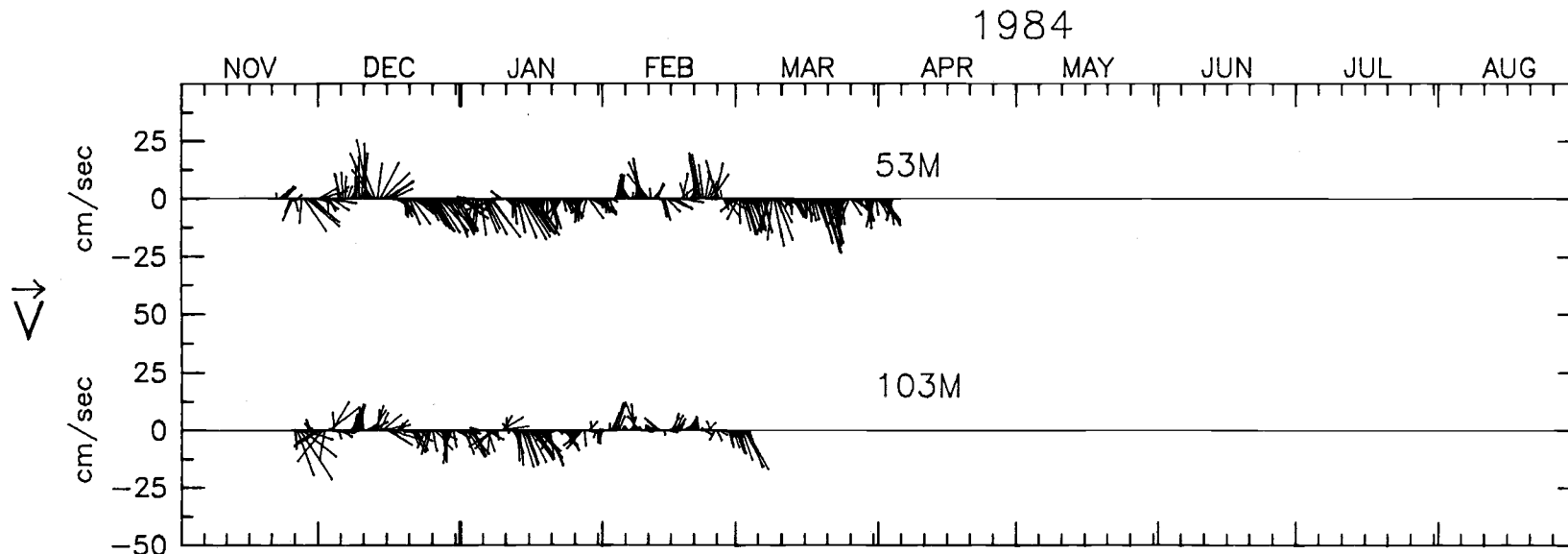


5 South Shelf Period IV

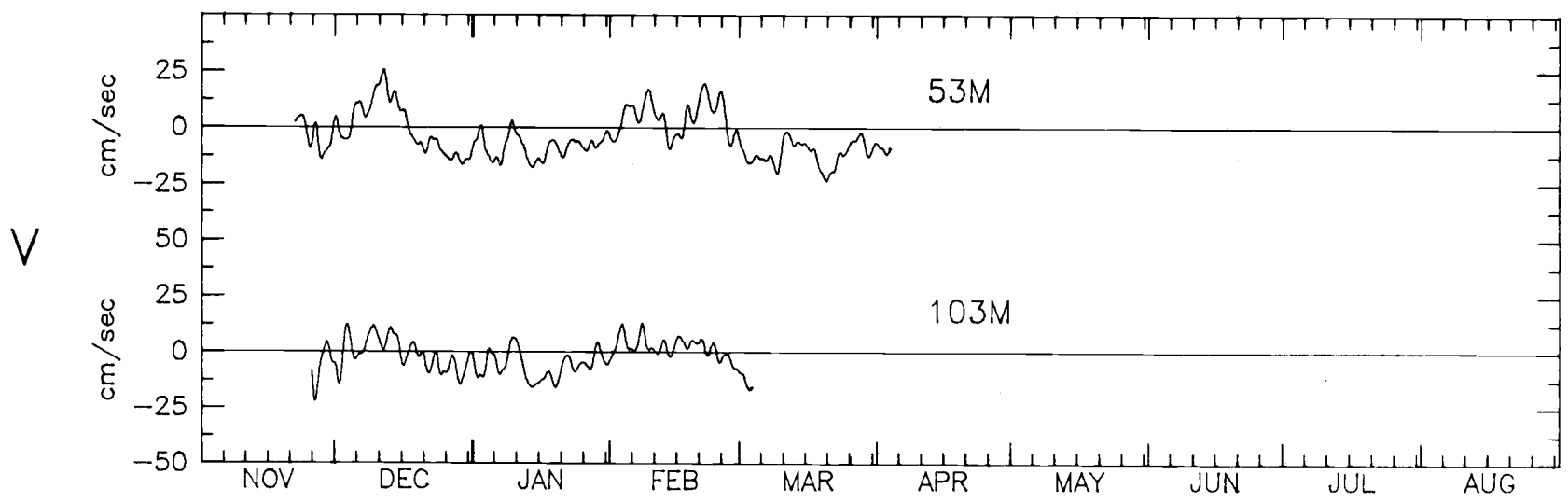
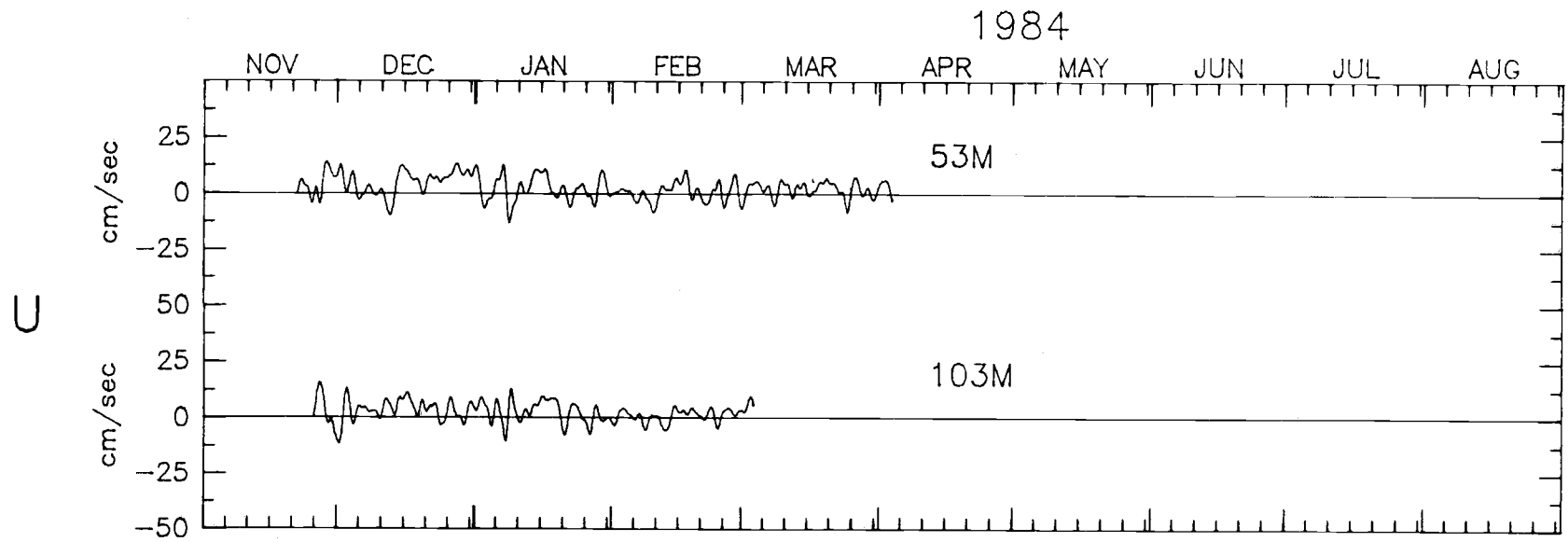
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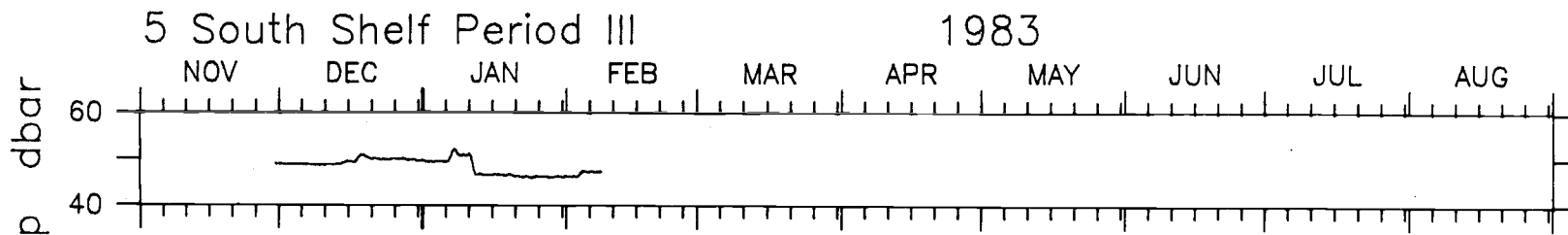
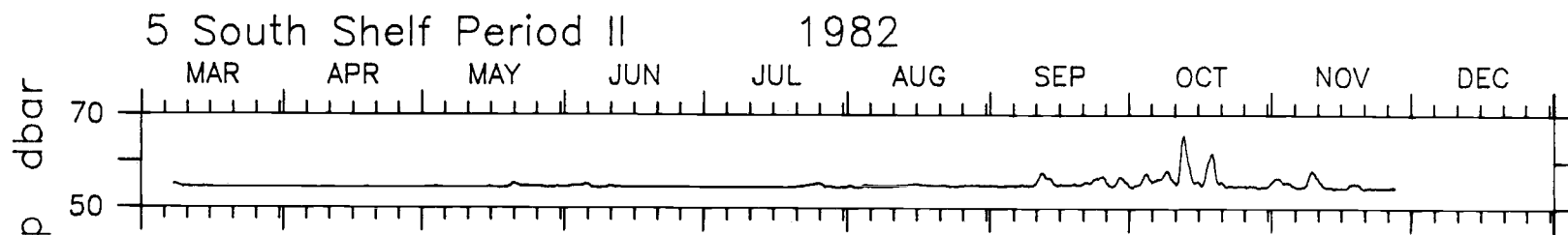
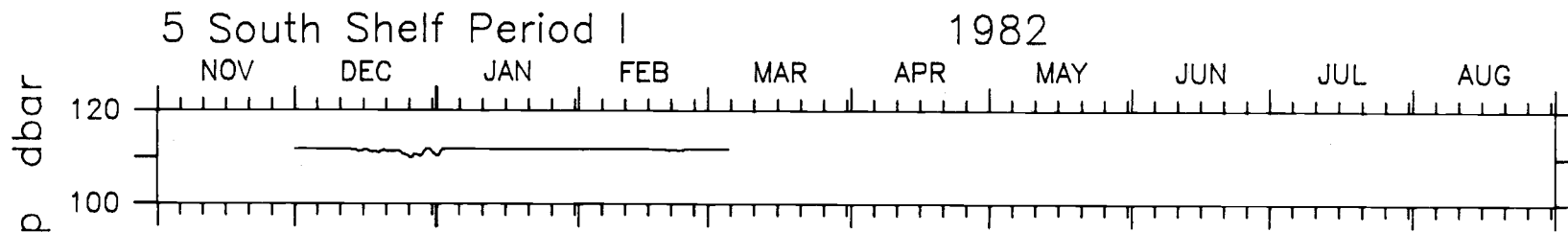
5 South Shelf Period IV

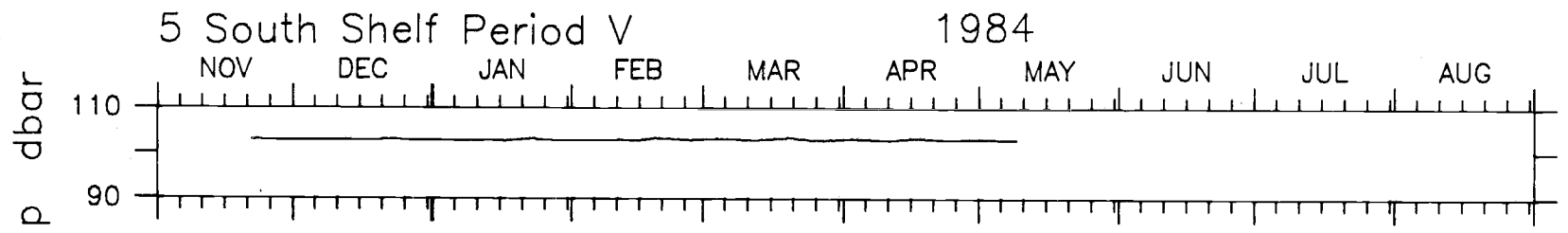
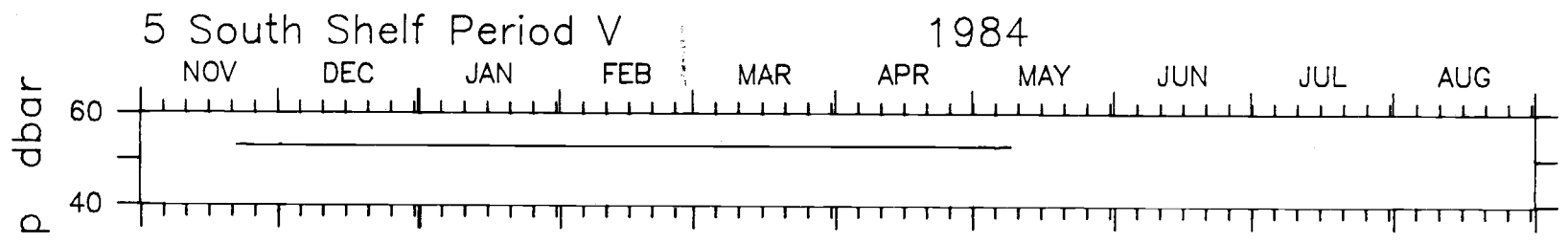
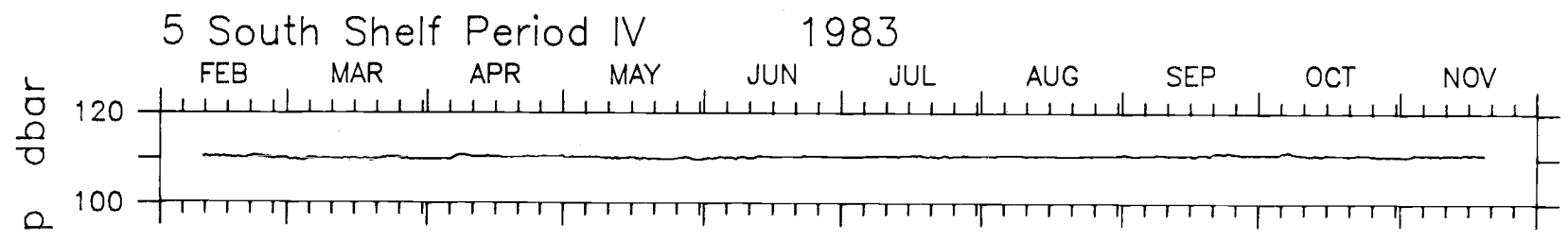
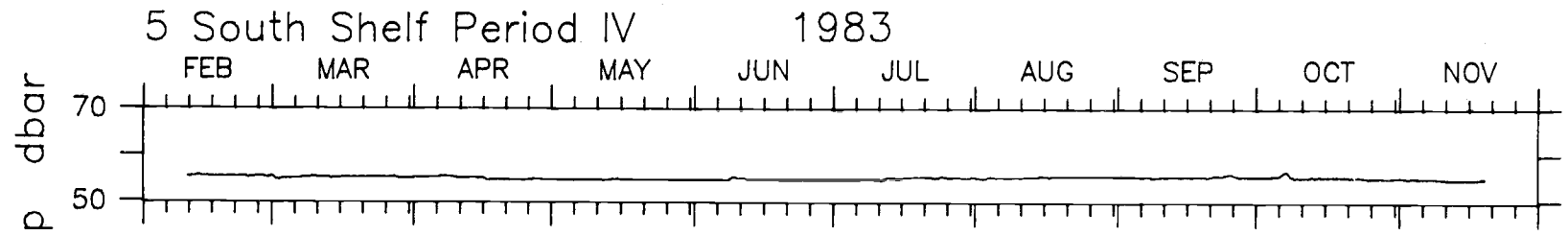


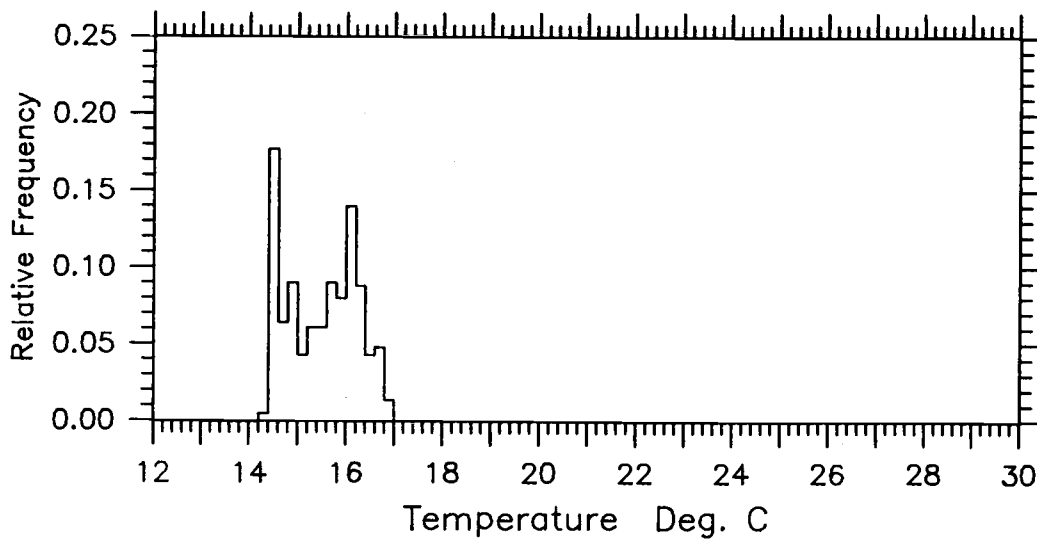
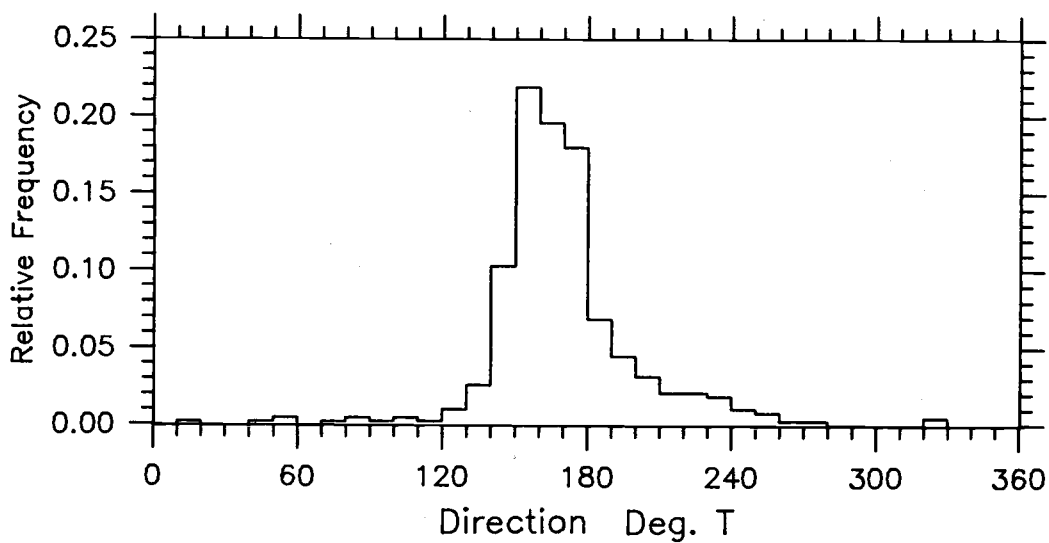
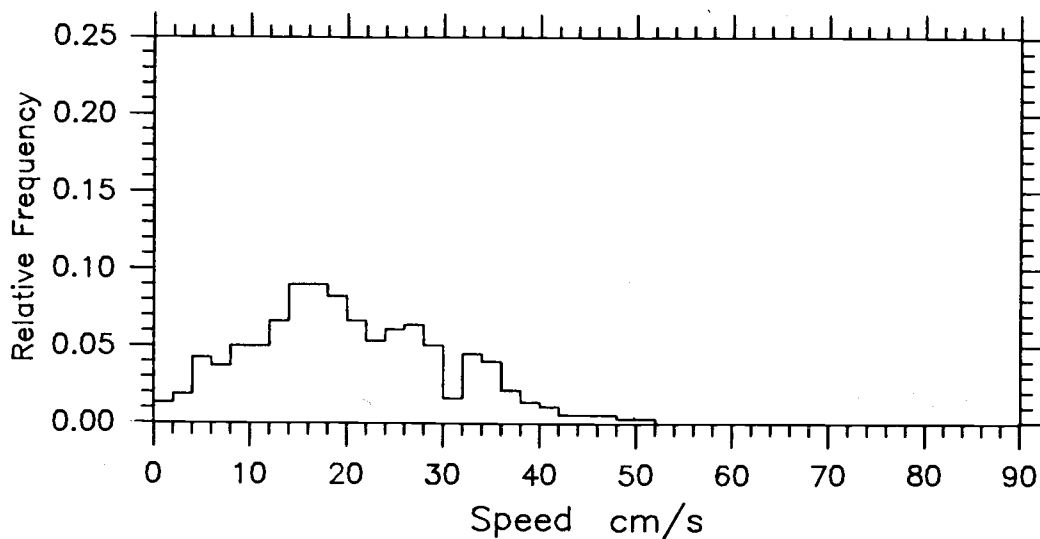
5 South Shelf Period V



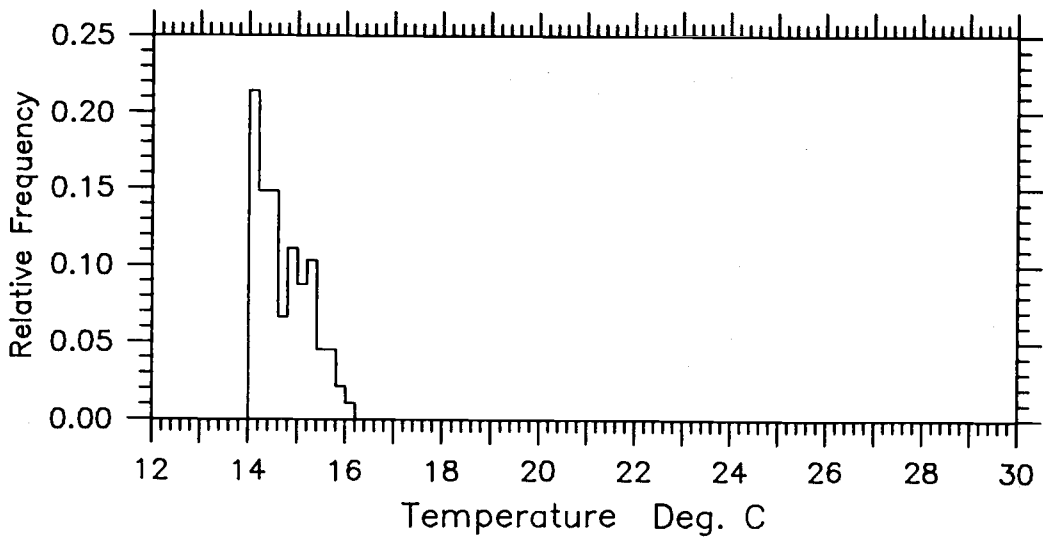
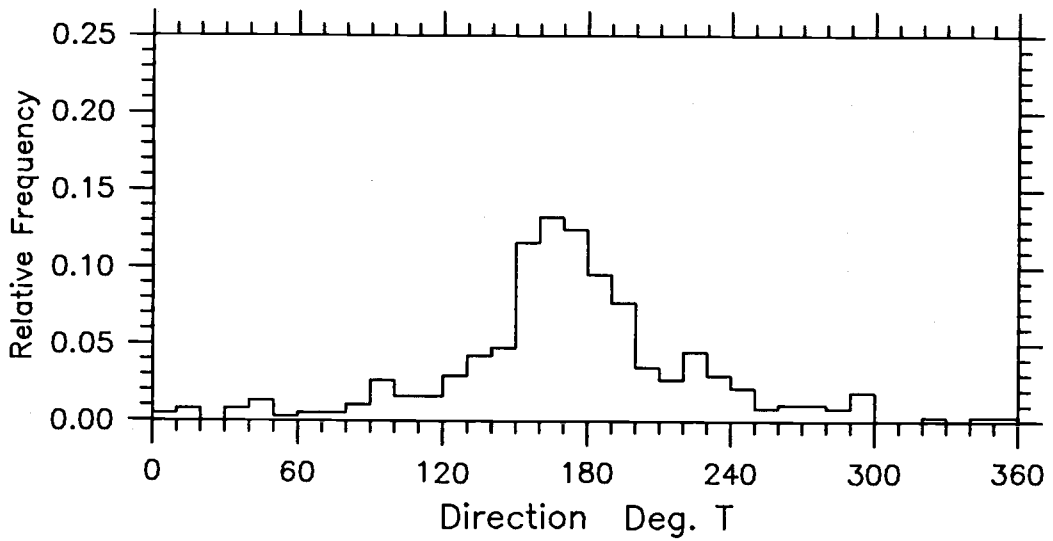
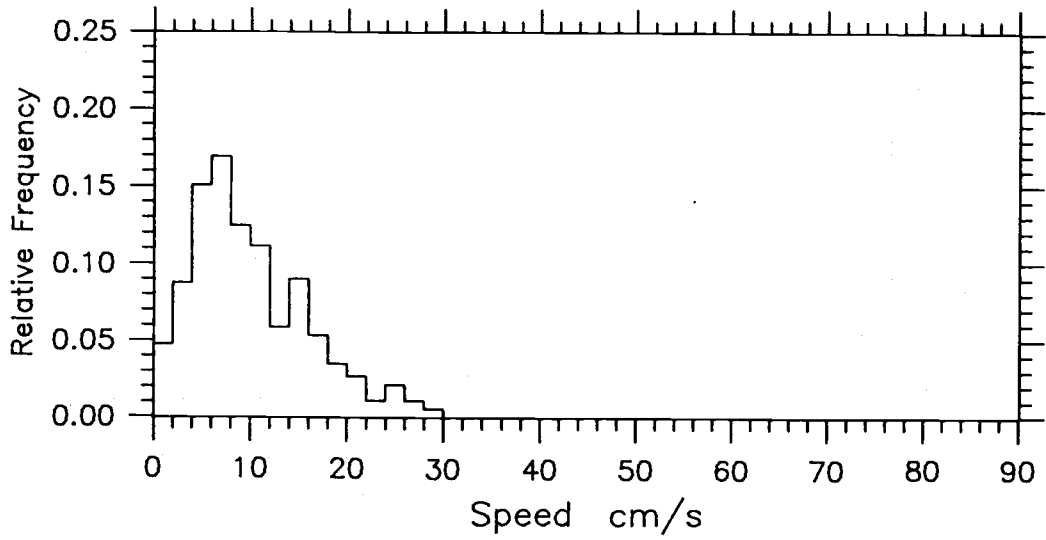
5 South Shelf Period V



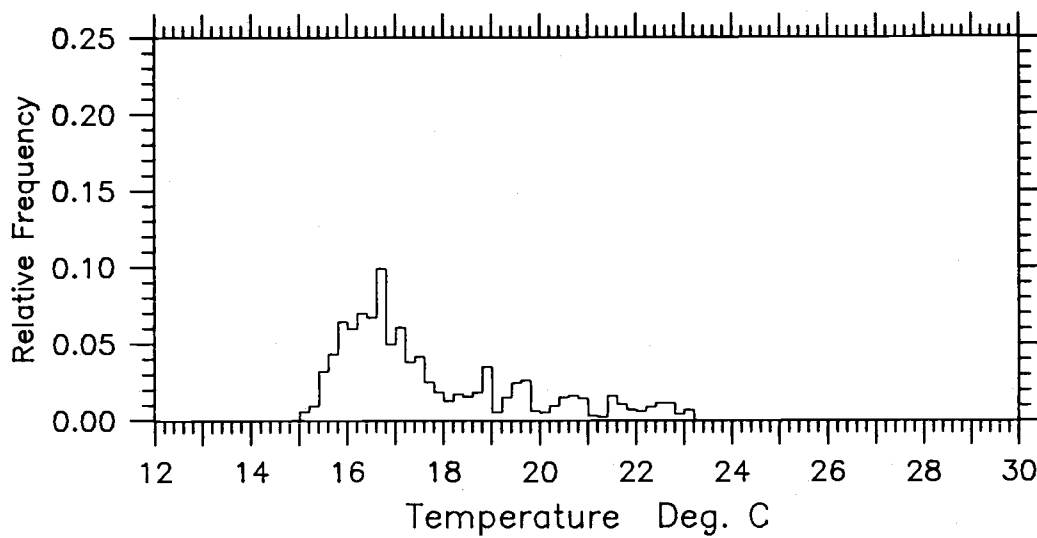
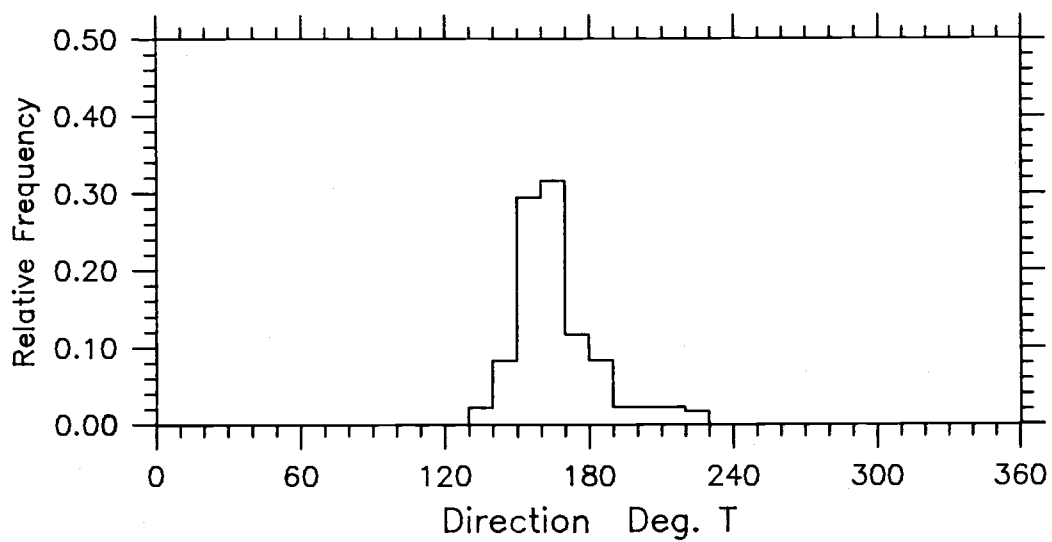
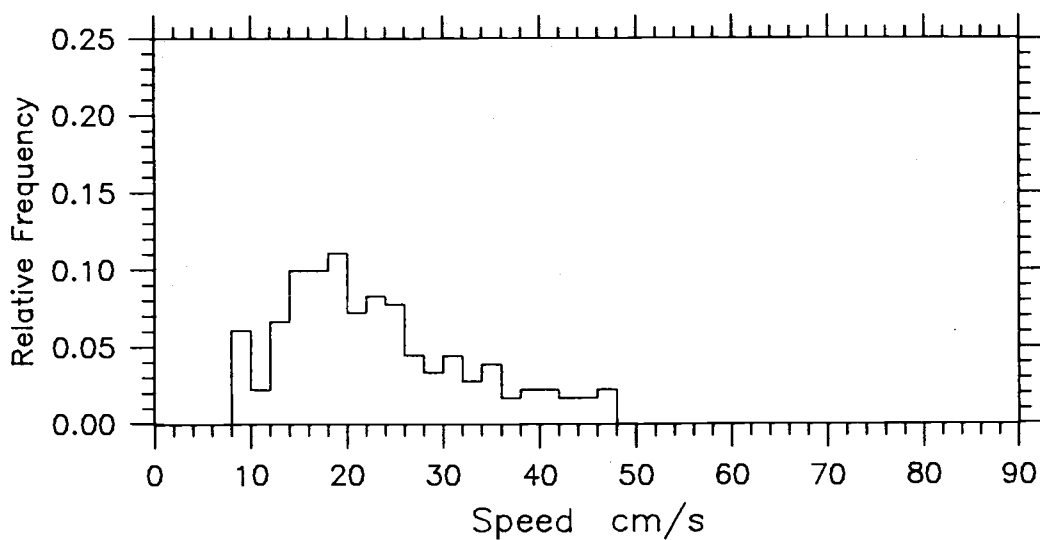




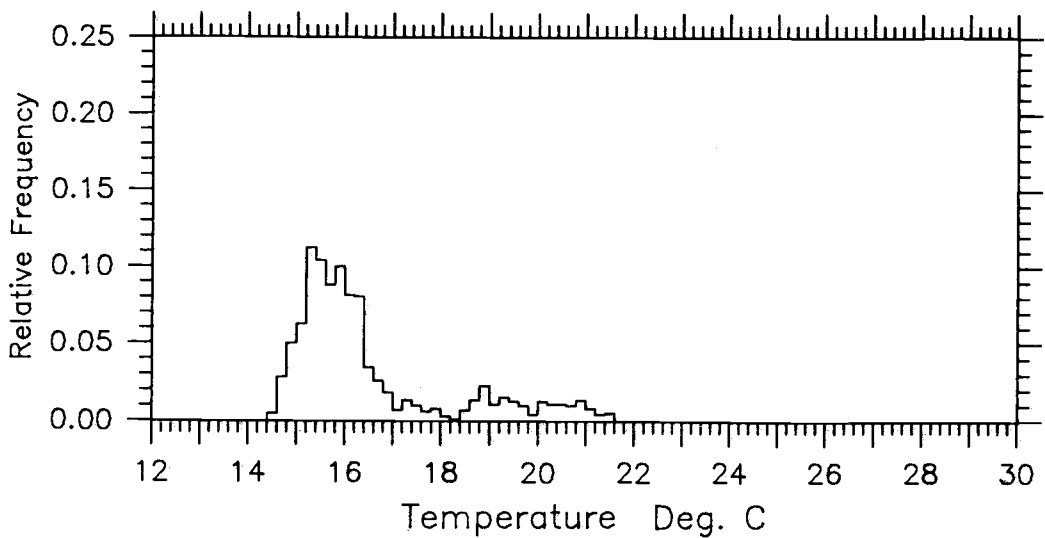
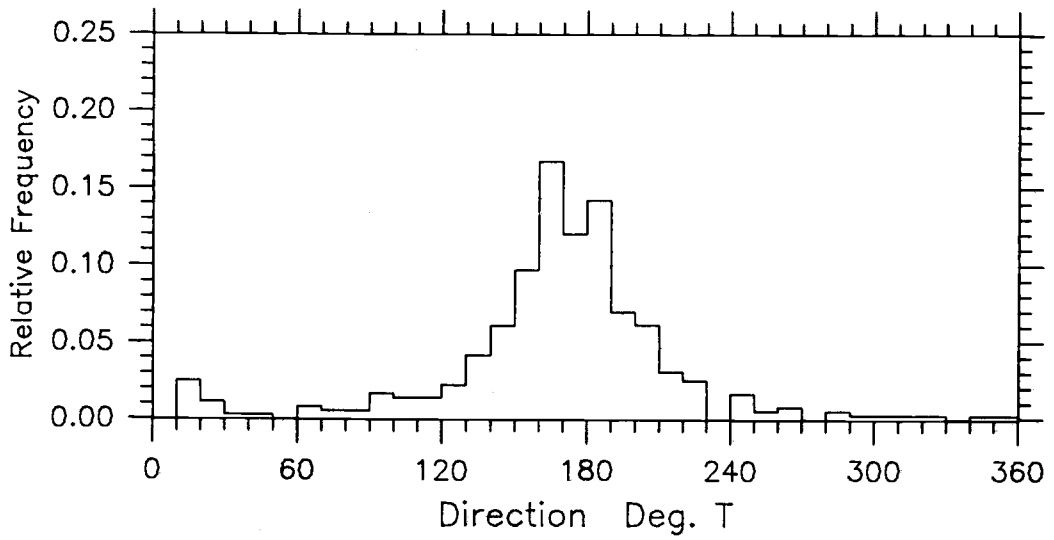
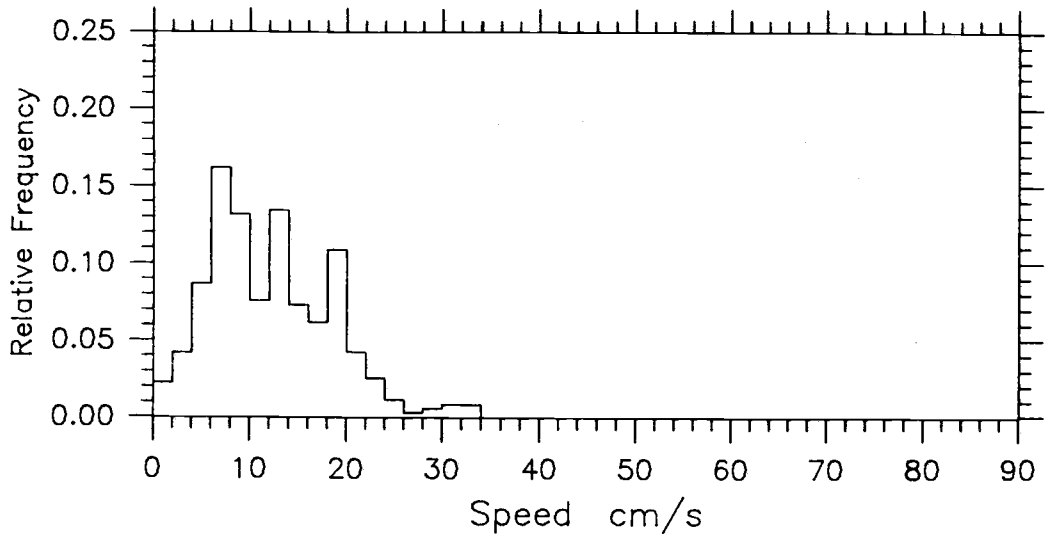
5 South Shelf Period I 62m



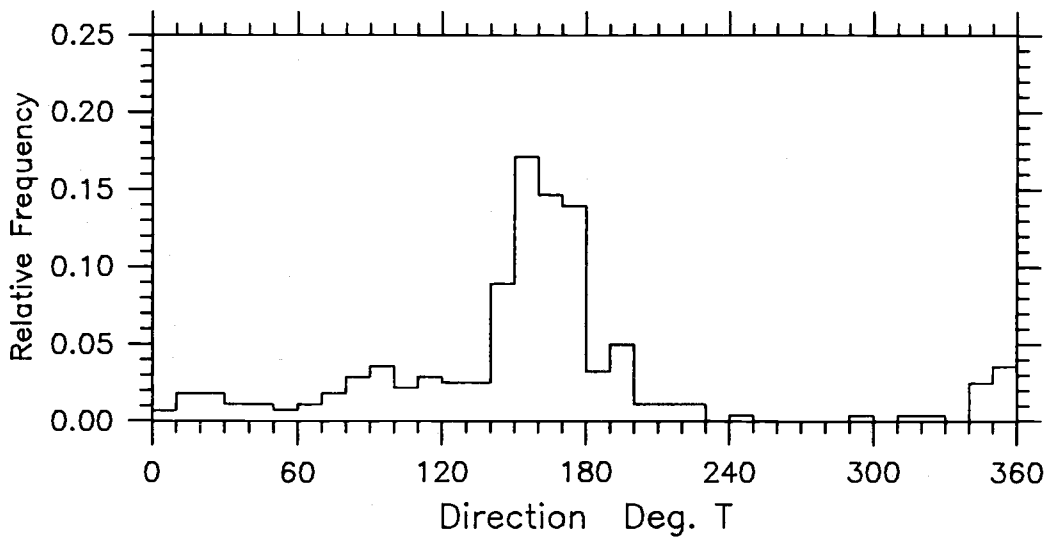
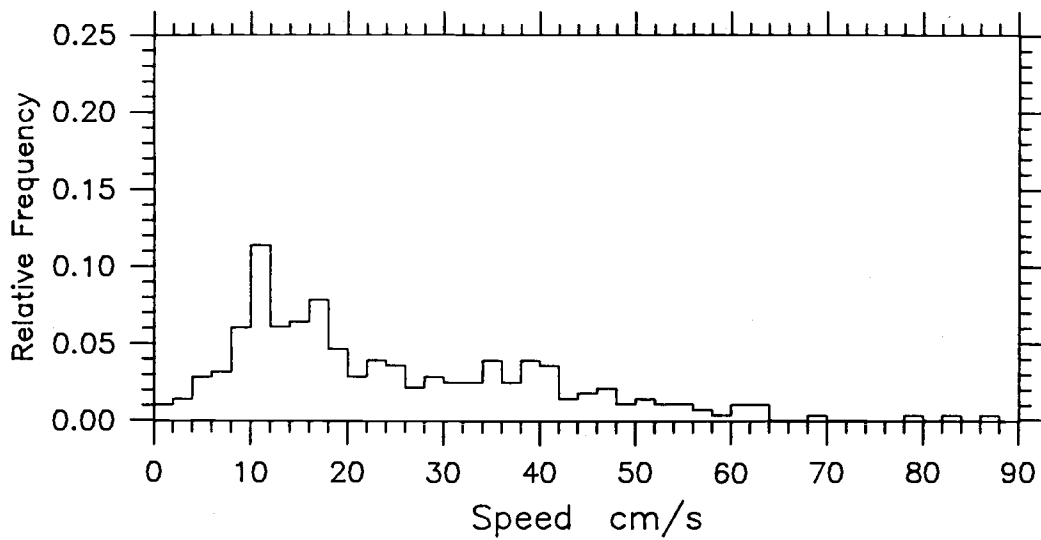
5 South Shelf Period I 112m



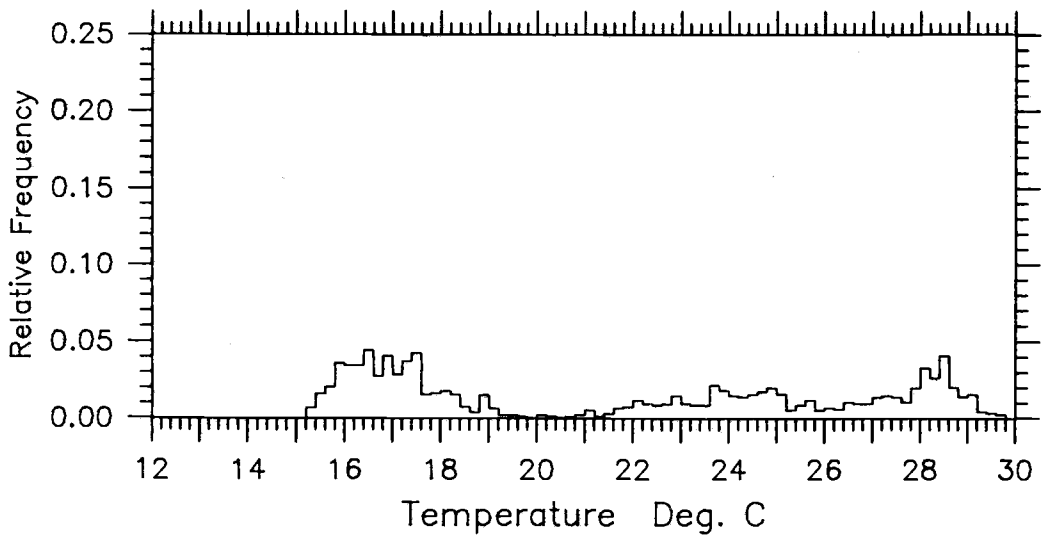
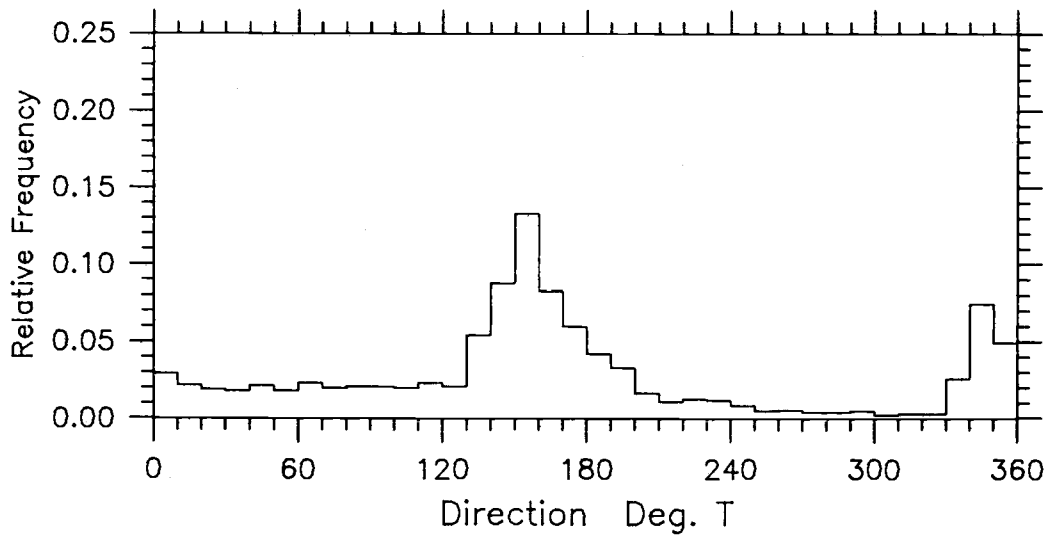
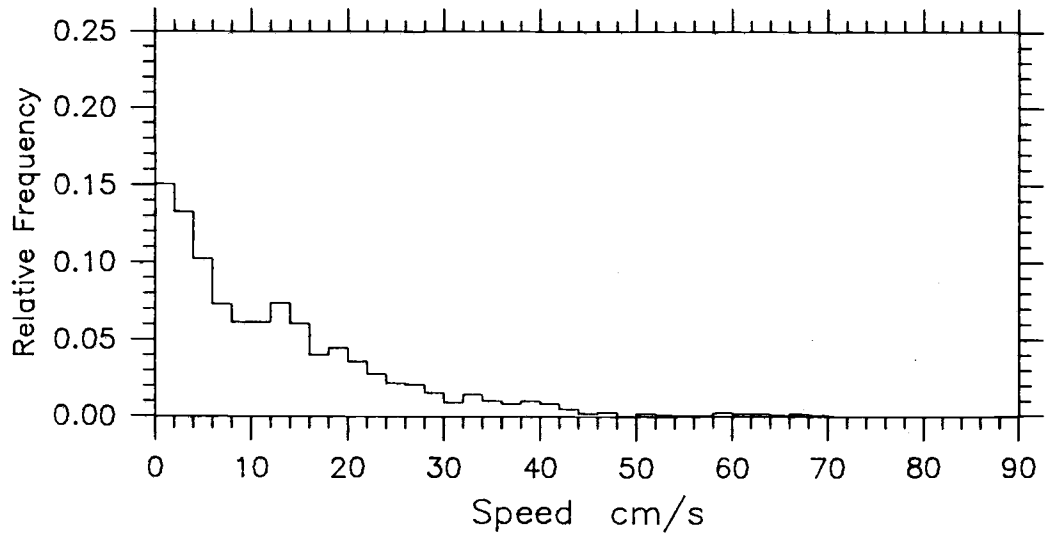
5 South Shelf Period II 55m



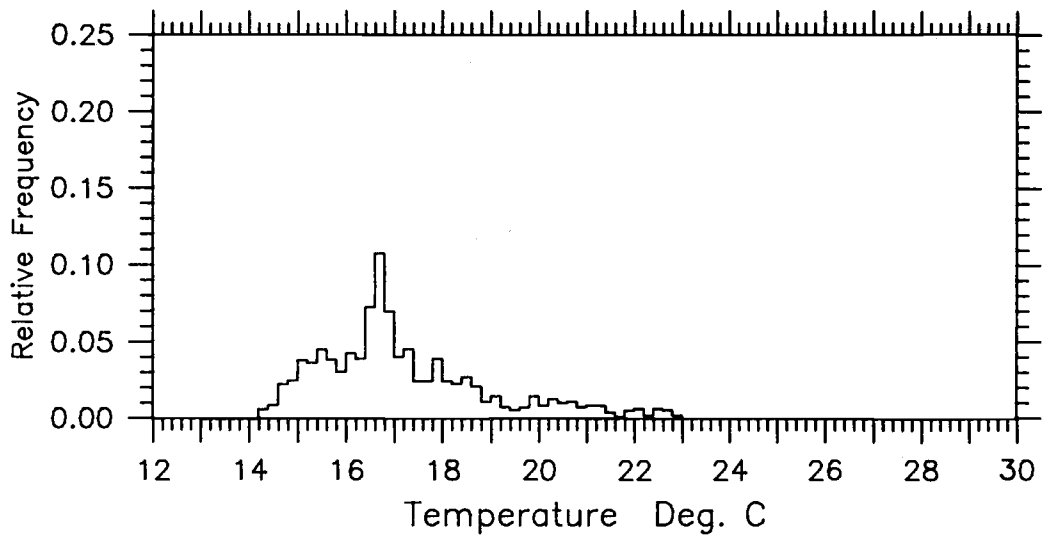
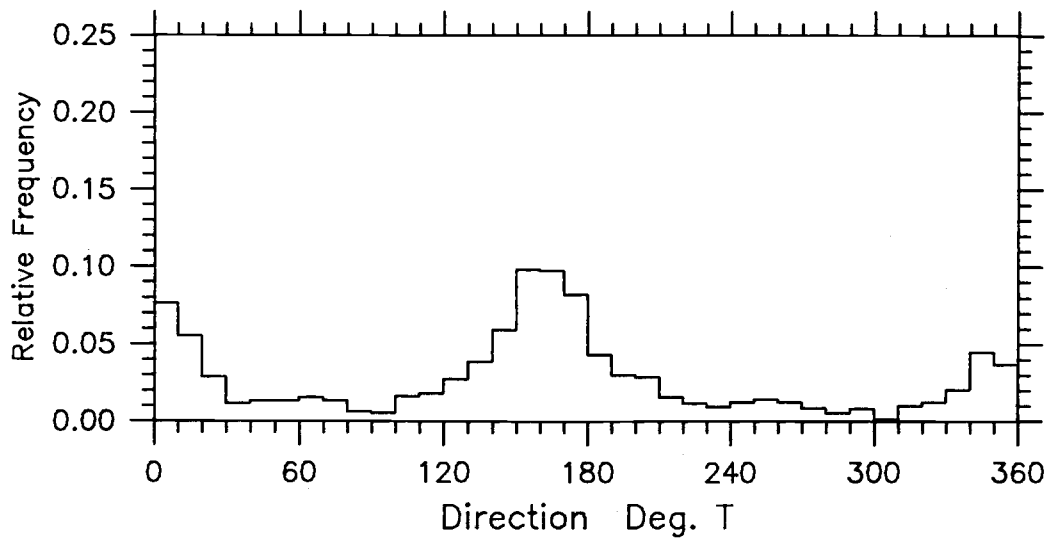
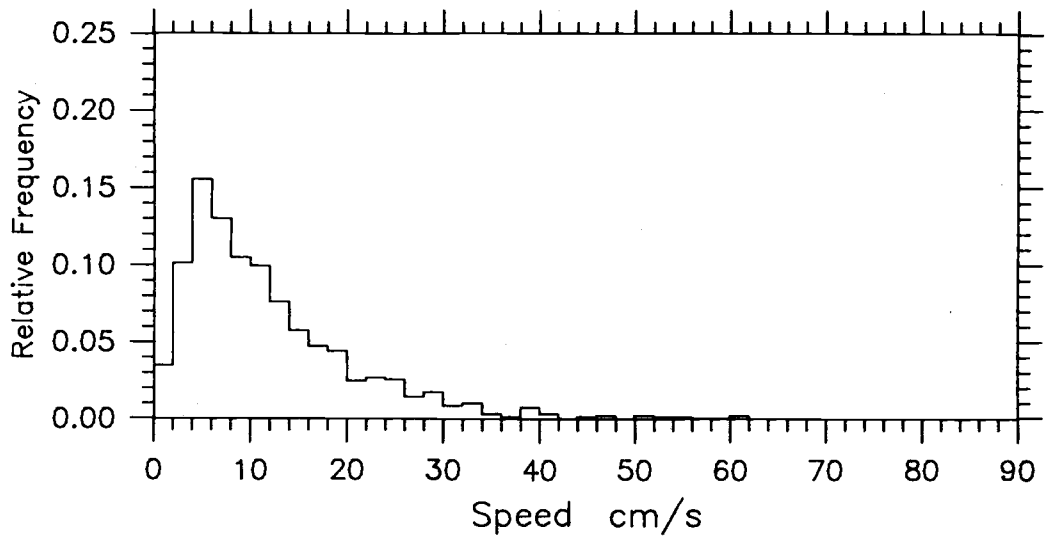
5 South Shelf Period II 105m



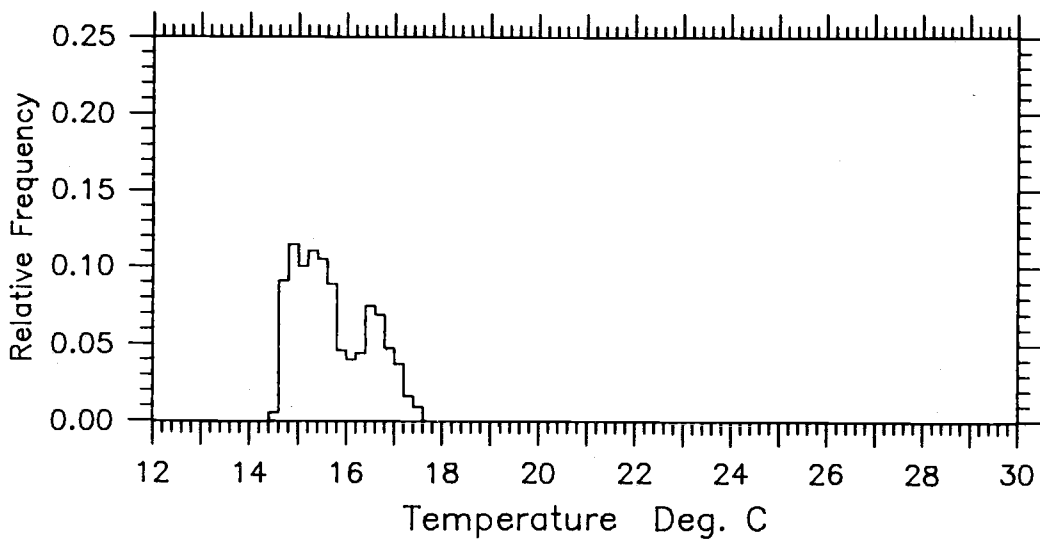
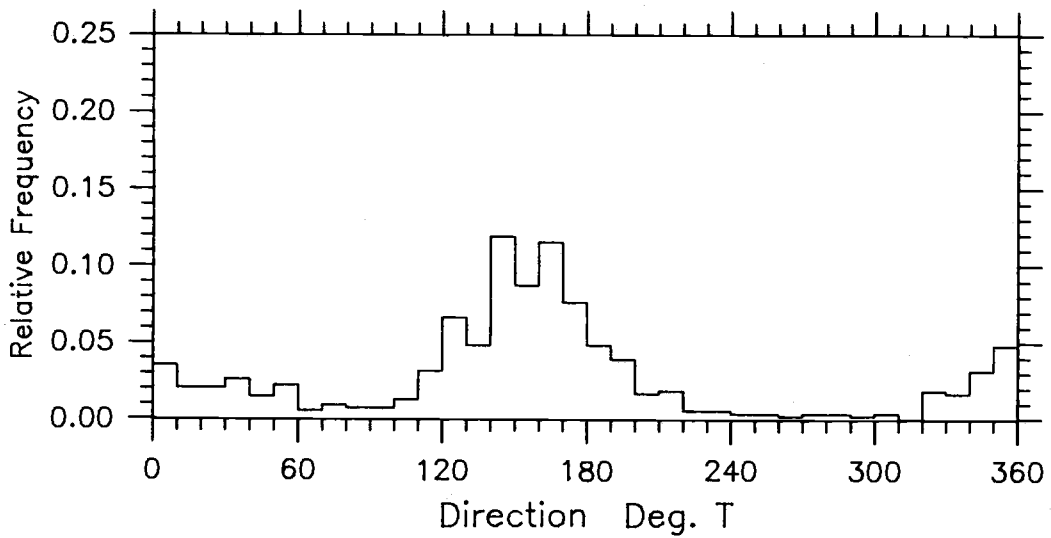
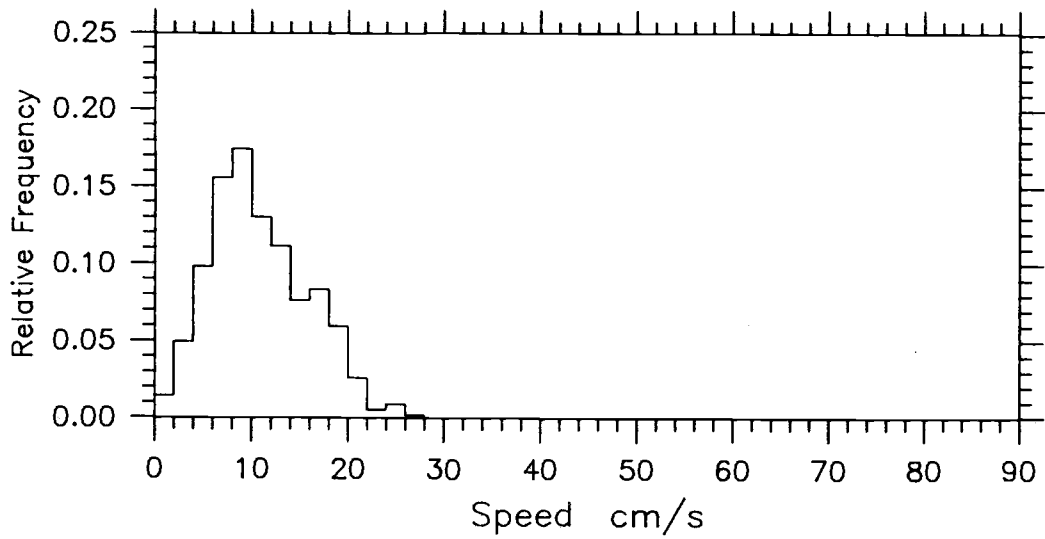
5 South Shelf Period III 48m



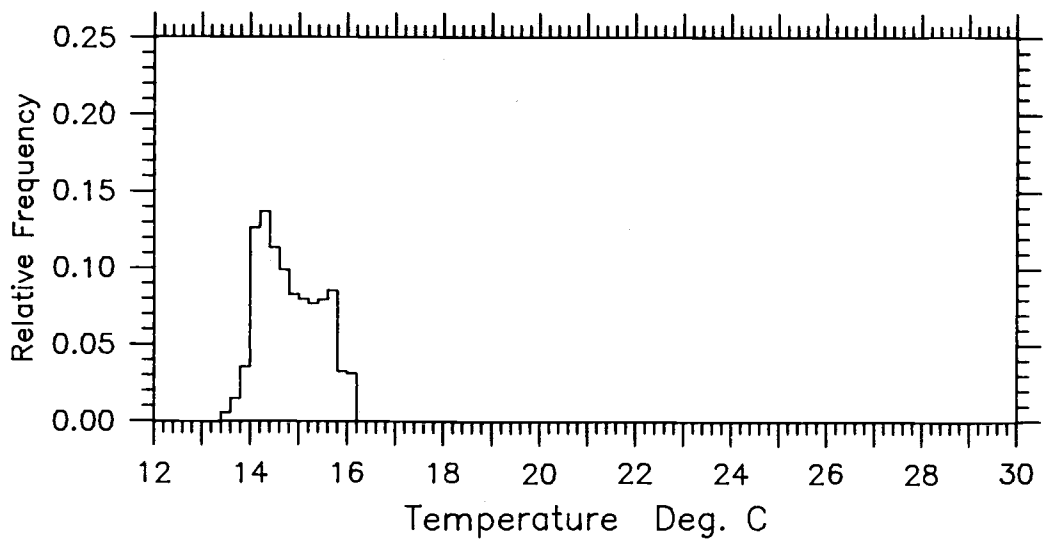
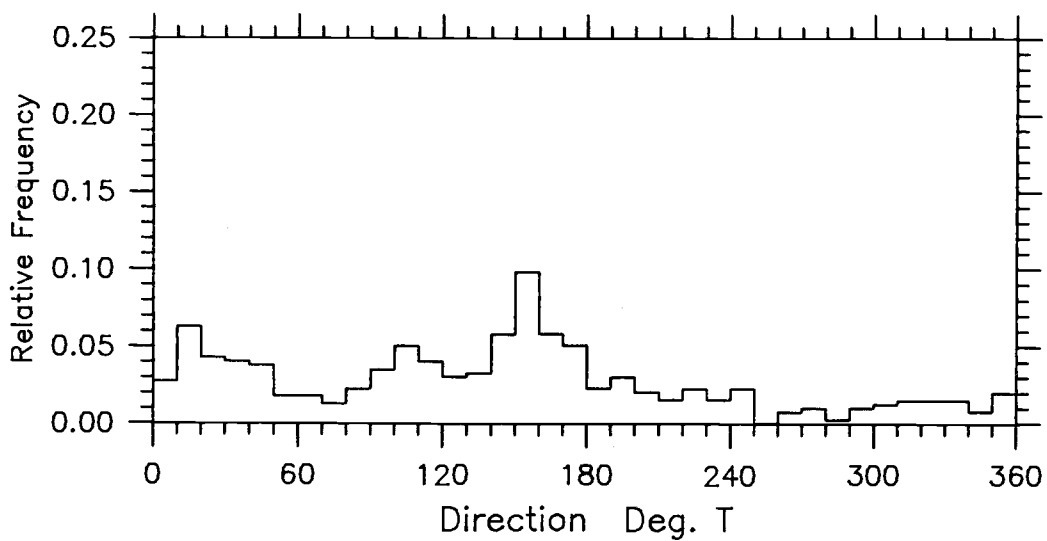
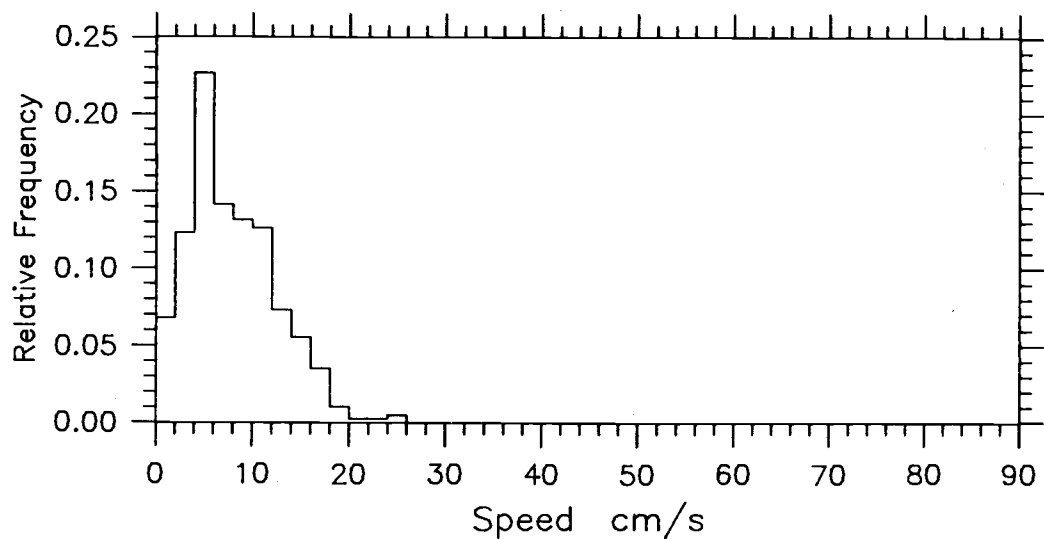
5 South Shelf Period IV 55m



5 South Shelf Period IV 110m



5 South Shelf Period V 53m

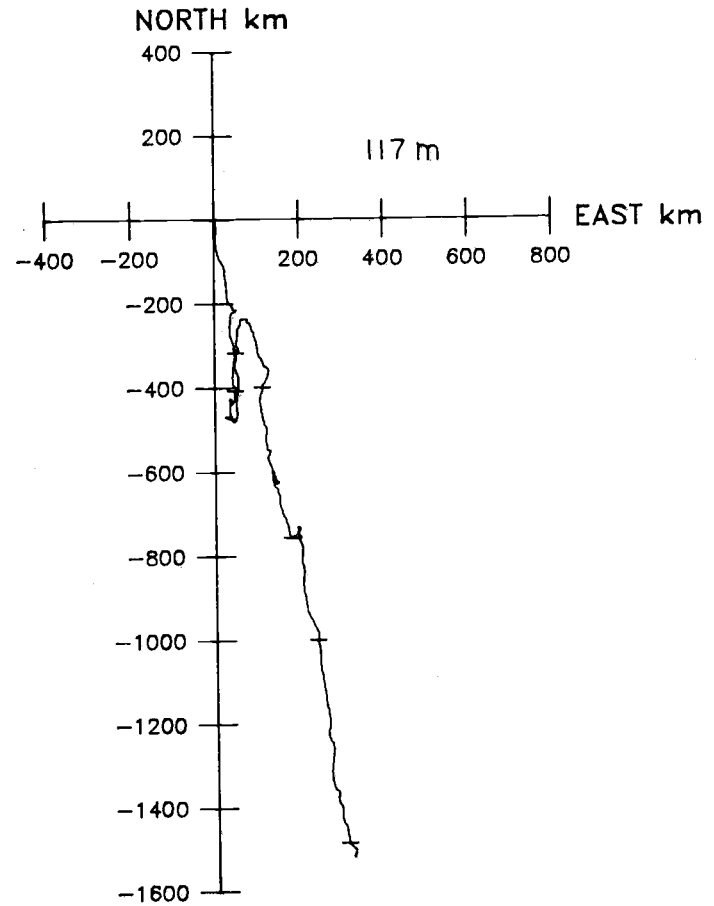
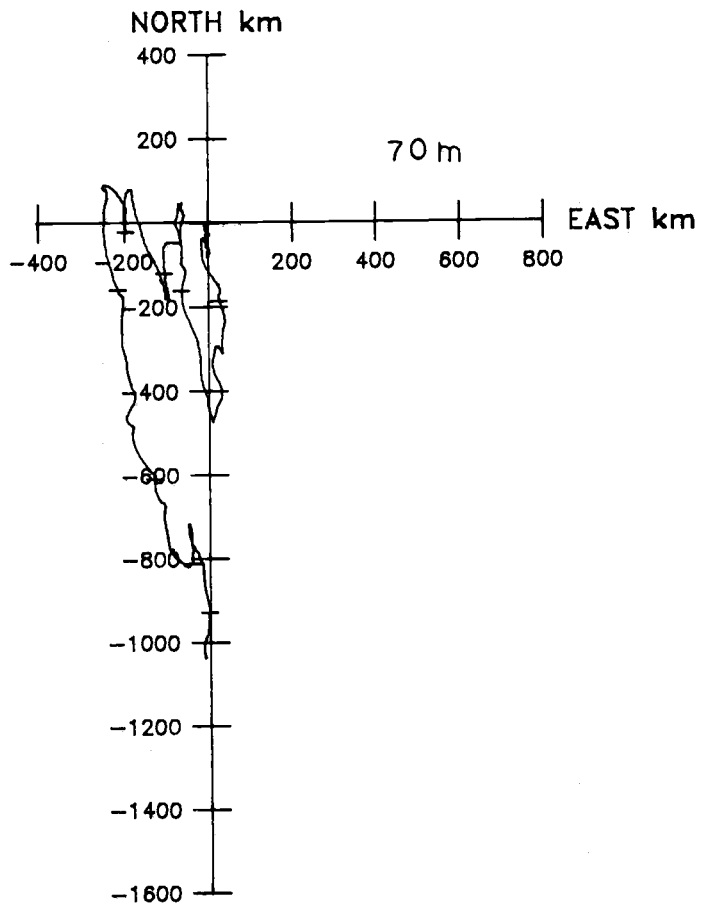


5 South Shelf Period V 103m

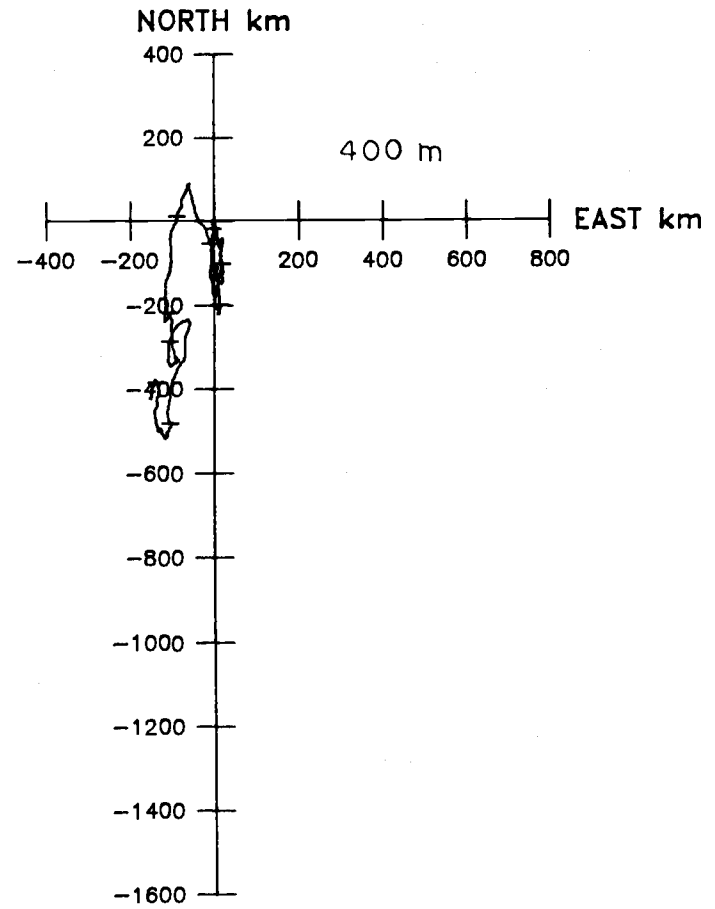
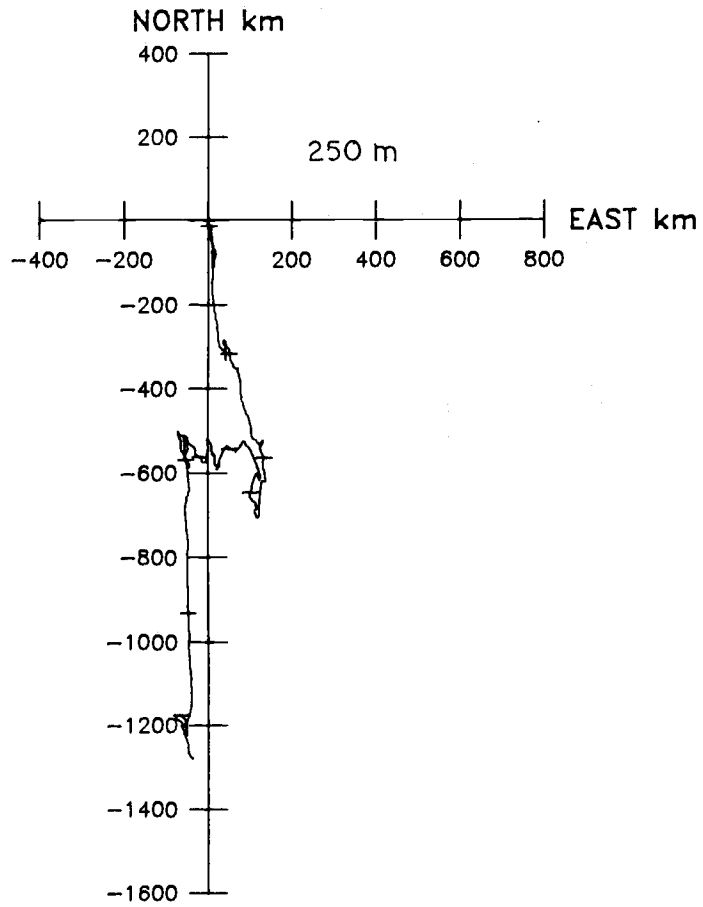
MOORING 5 SOUTH SLOPE

MOORING 5 South Slope

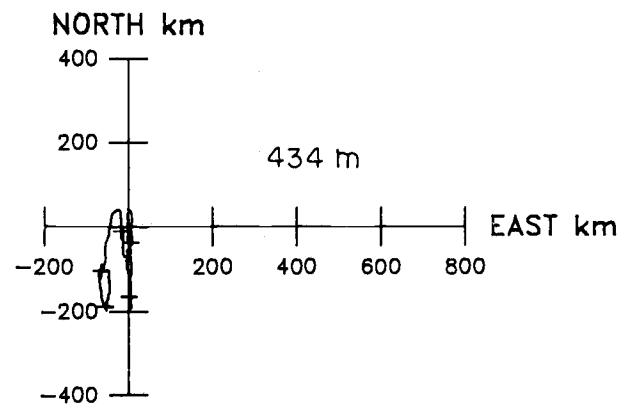
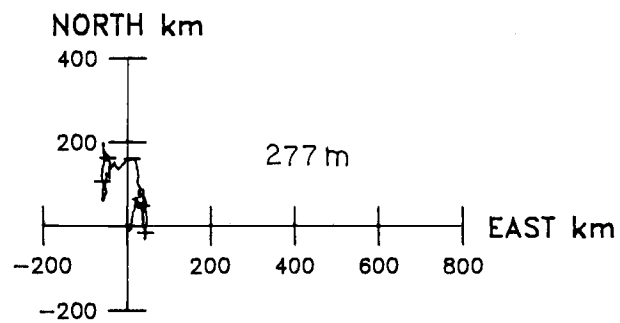
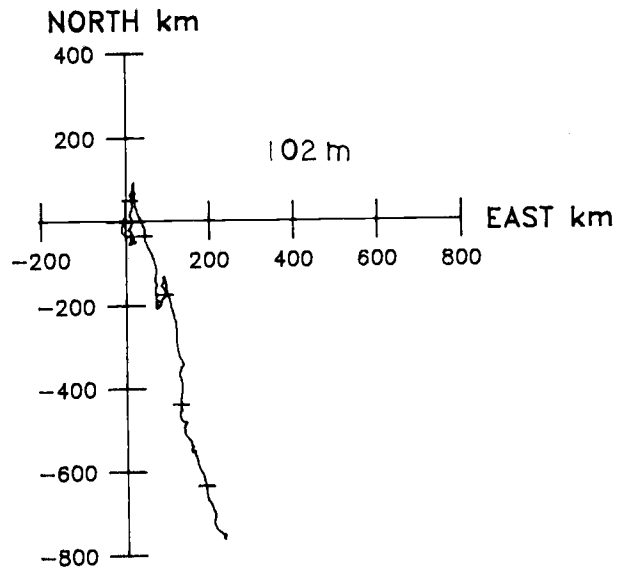
PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T [Deg.C]	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
IV	70	1003	1118	0.0 (6.3)	-4.8 (17.7)	20.25 (4.08)	14.77	28.54	4.8	180.5	-10.4
	117	740	1118	2.0 (4.7)	-9.5 (13.9)	16.15 (1.23)	13.42	20.71	9.7	168.0	-5.5
	250	1118	1118	-0.2 (4.3)	-5.3 (13.1)	12.72 (0.83)	10.28	14.34	5.3	181.7	-7.0
	400	1118	1118	-0.6 (3.4)	-1.7 (10.9)	9.24 (0.79)	7.99	11.44	1.9	200.0	0.1
V	102	667	667	1.6 (4.4)	-5.3 (9.8)	14.79 (0.51)	13.91	15.94	5.5	163.0	-7.7
	152		667			14.12 (0.57)	12.99	15.21			
	277	667	667	-0.3 (3.1)	0.9 (8.2)	12.23 (0.66)	10.73	13.96	0.9	338.8	1.6
	434	667	667	-0.3 (2.1)	-0.8 (9.7)	9.34 (0.45)	8.44	10.41	0.8	202.7	0.8
VI	112	593	1265	1.5 (4.8)	-3.1 (9.6)	14.59 (0.48)	13.81	15.66	3.4	154.5	-11.1
	160	1266	1266	1.0 (3.7)	-2.2 (10.2)	14.22 (0.42)	13.44	15.18	2.4	156.2	-7.9
	283	1265	1265	-0.6 (3.4)	0.3 (11.6)	11.98 (0.55)	10.54	13.64	0.7	299.5	2.8
	434	41	1266	0.5 (0.8)	-2.3 (7.0)	9.48 (0.43)	8.35	10.57	2.3	168.2	-2.5
	730	1266	1266	-0.3 (1.8)	-2.7 (7.5)	6.09 (0.31)	5.48	7.05	2.7	186.3	8.3



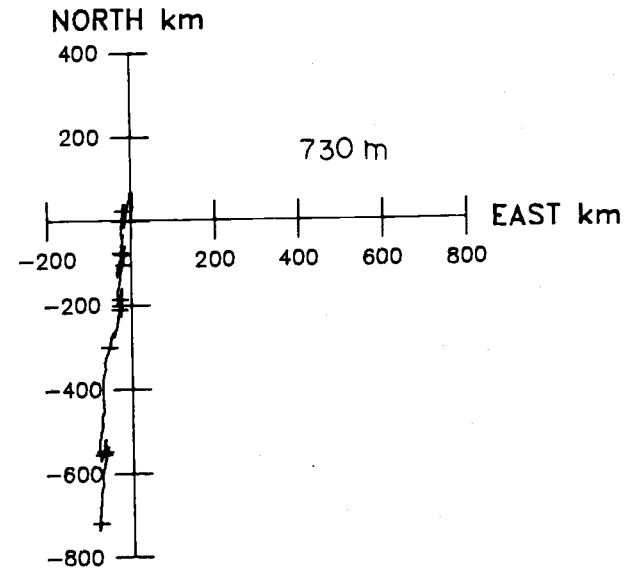
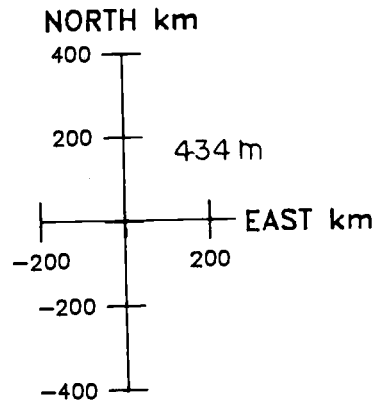
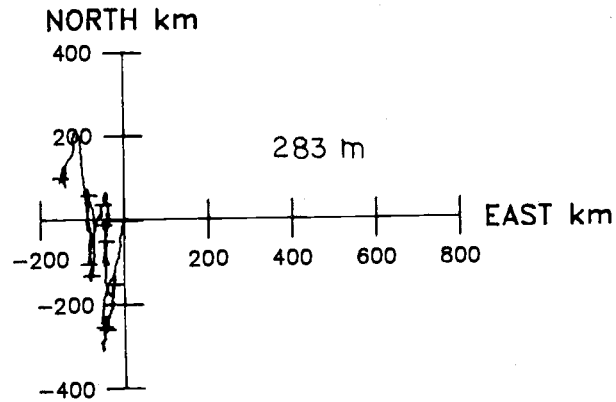
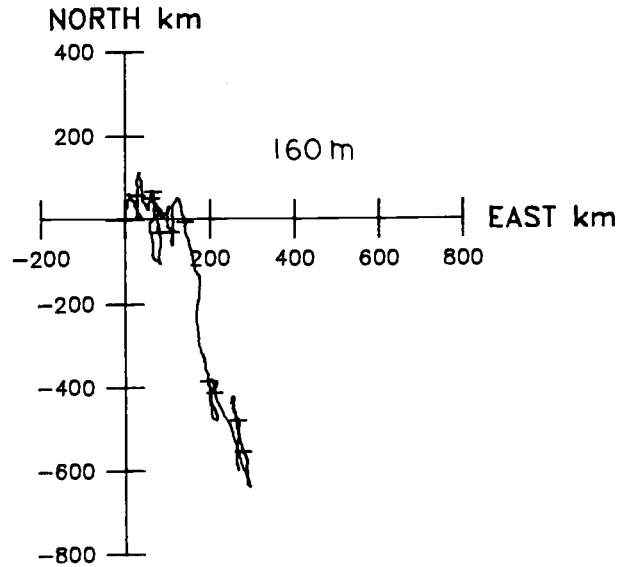
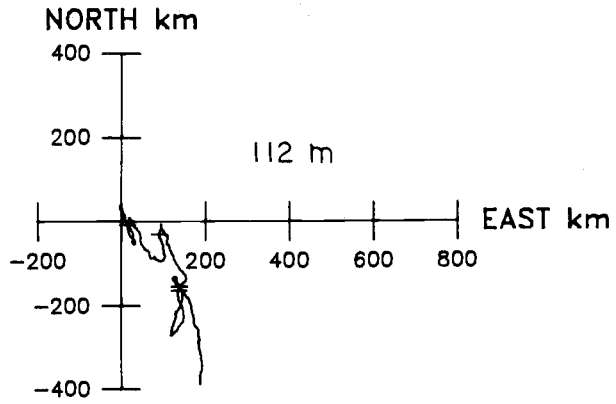
5 South Slope Period IV



5 South Slope Period IV

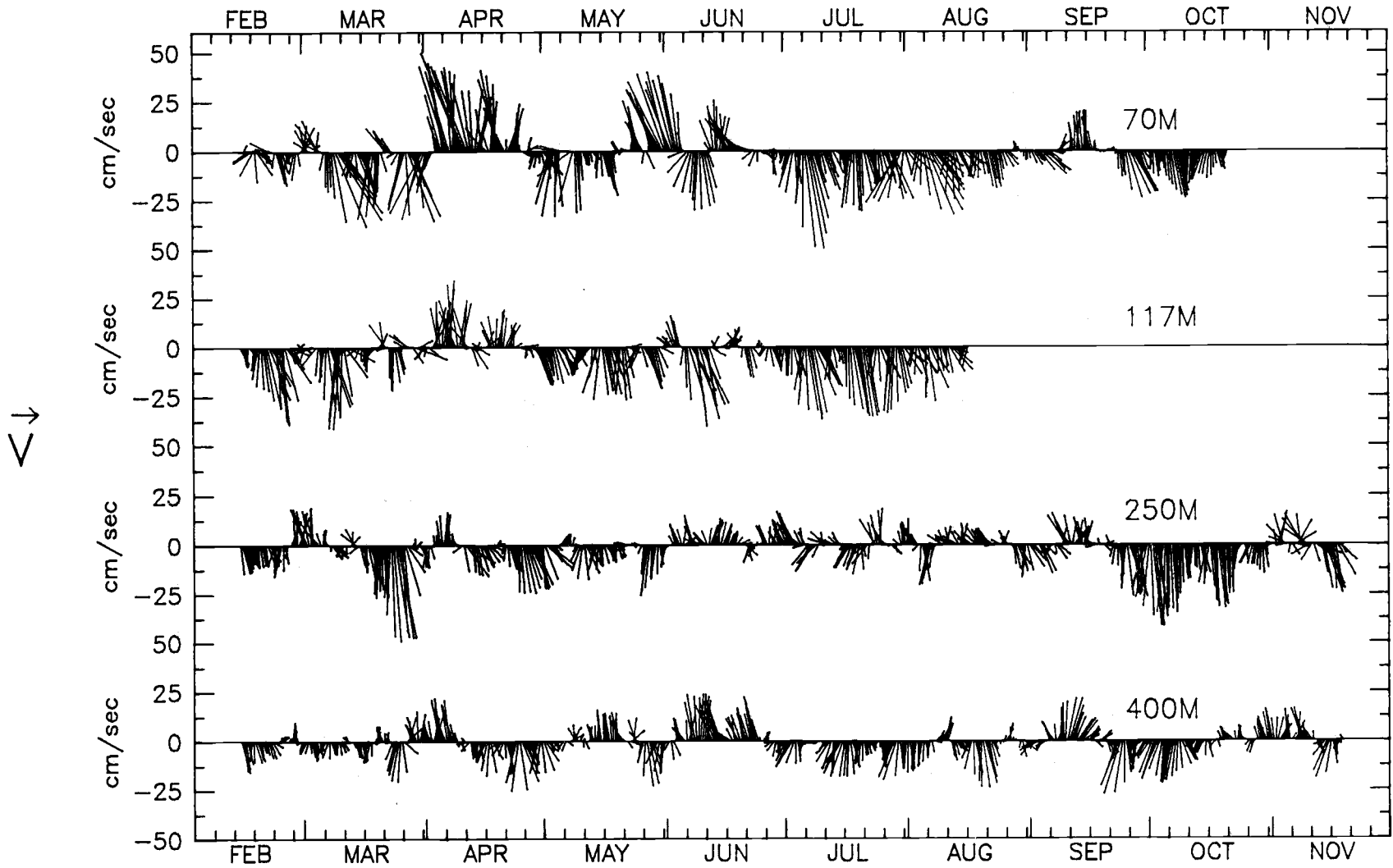


5 South Slope Period V

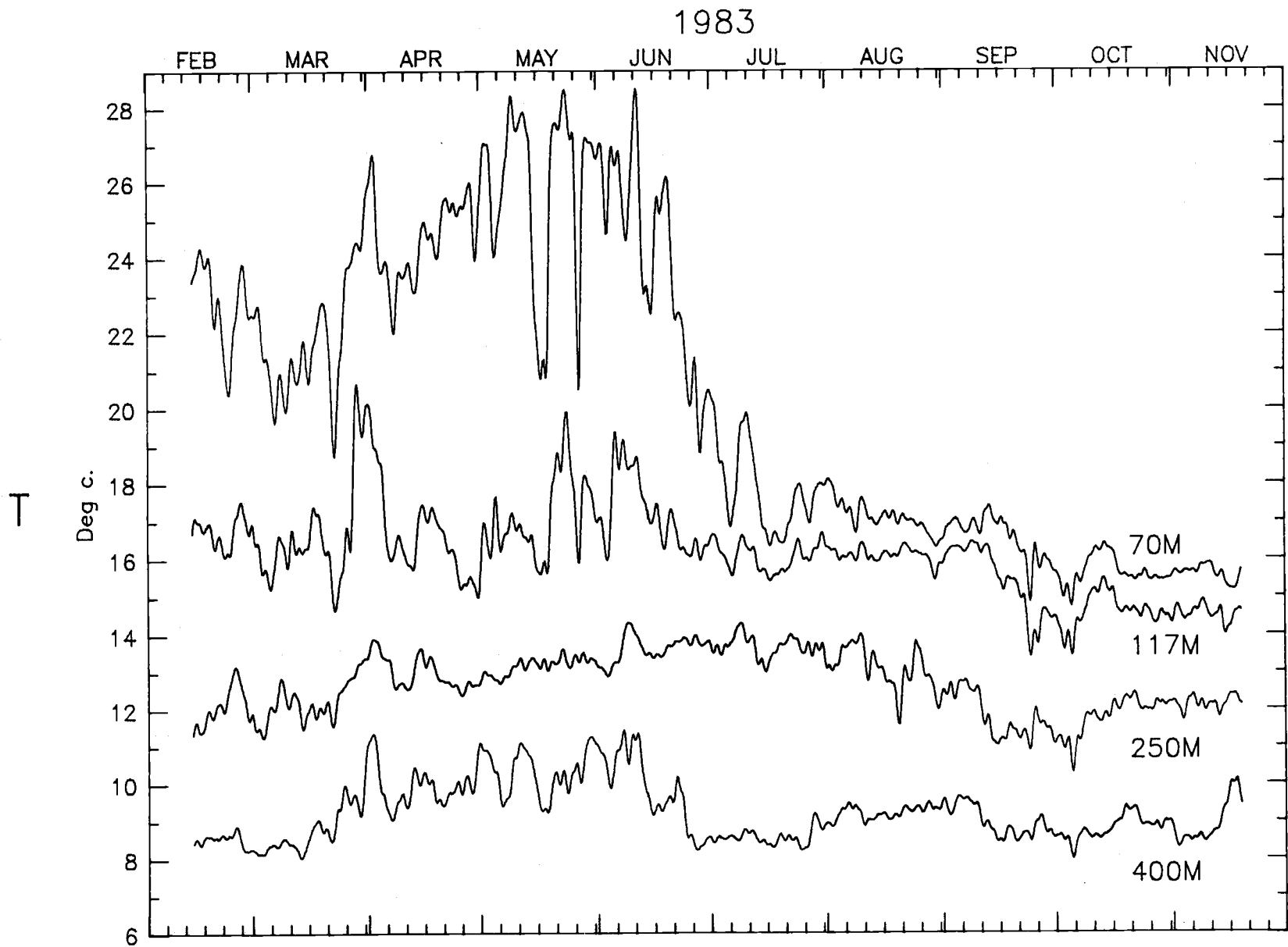


5 South Slope Period VI

1983

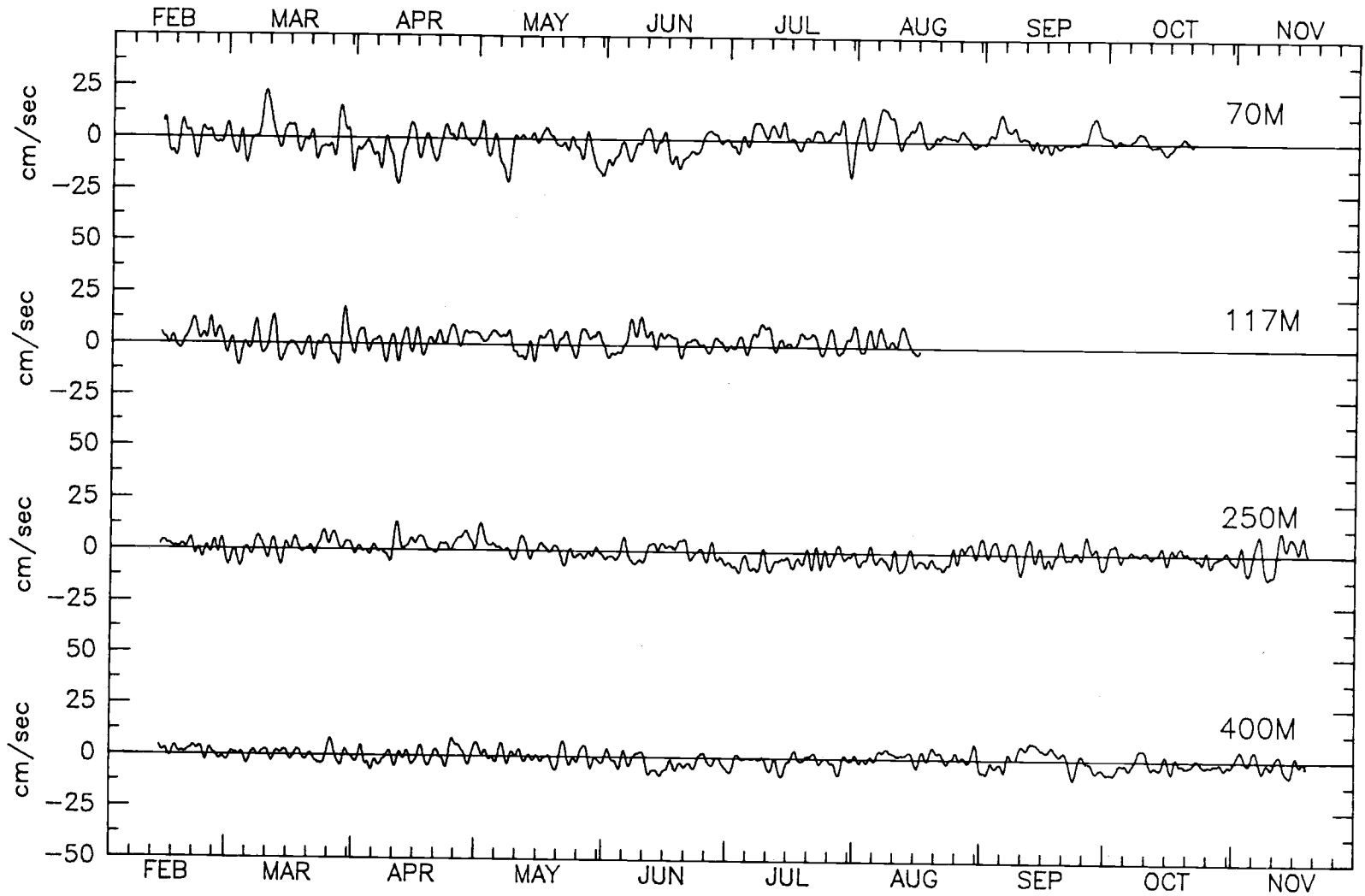


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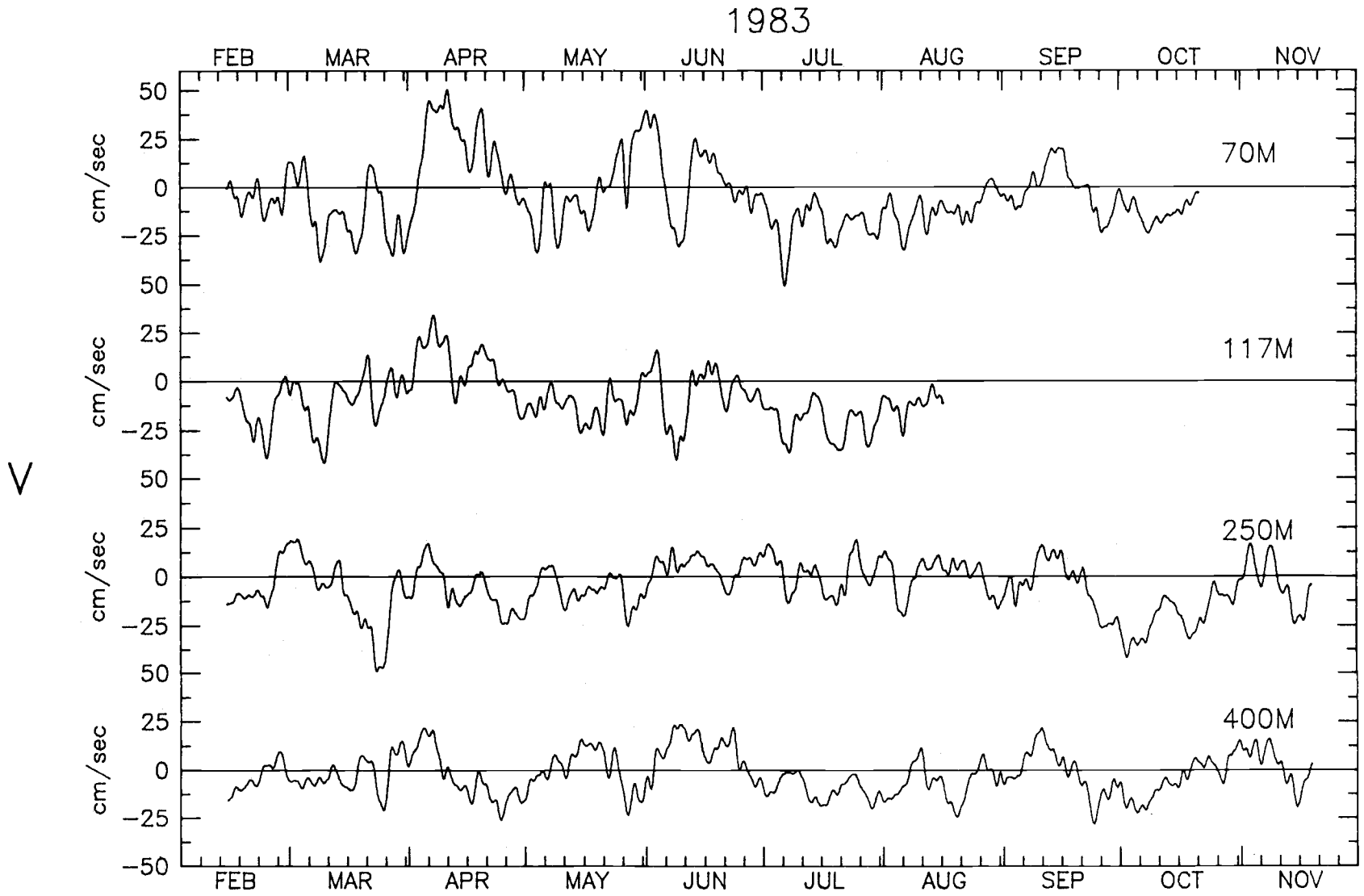
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1983

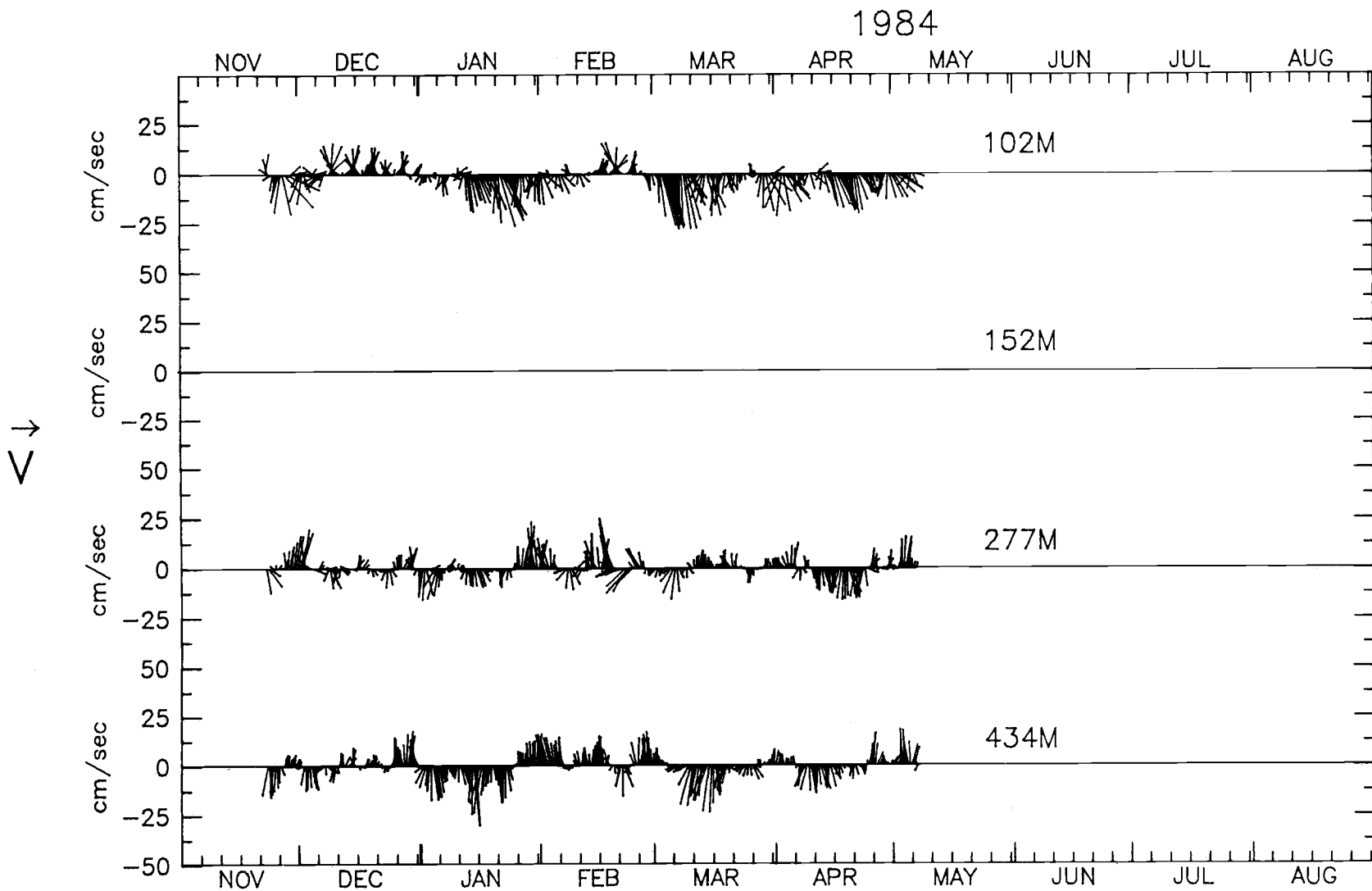


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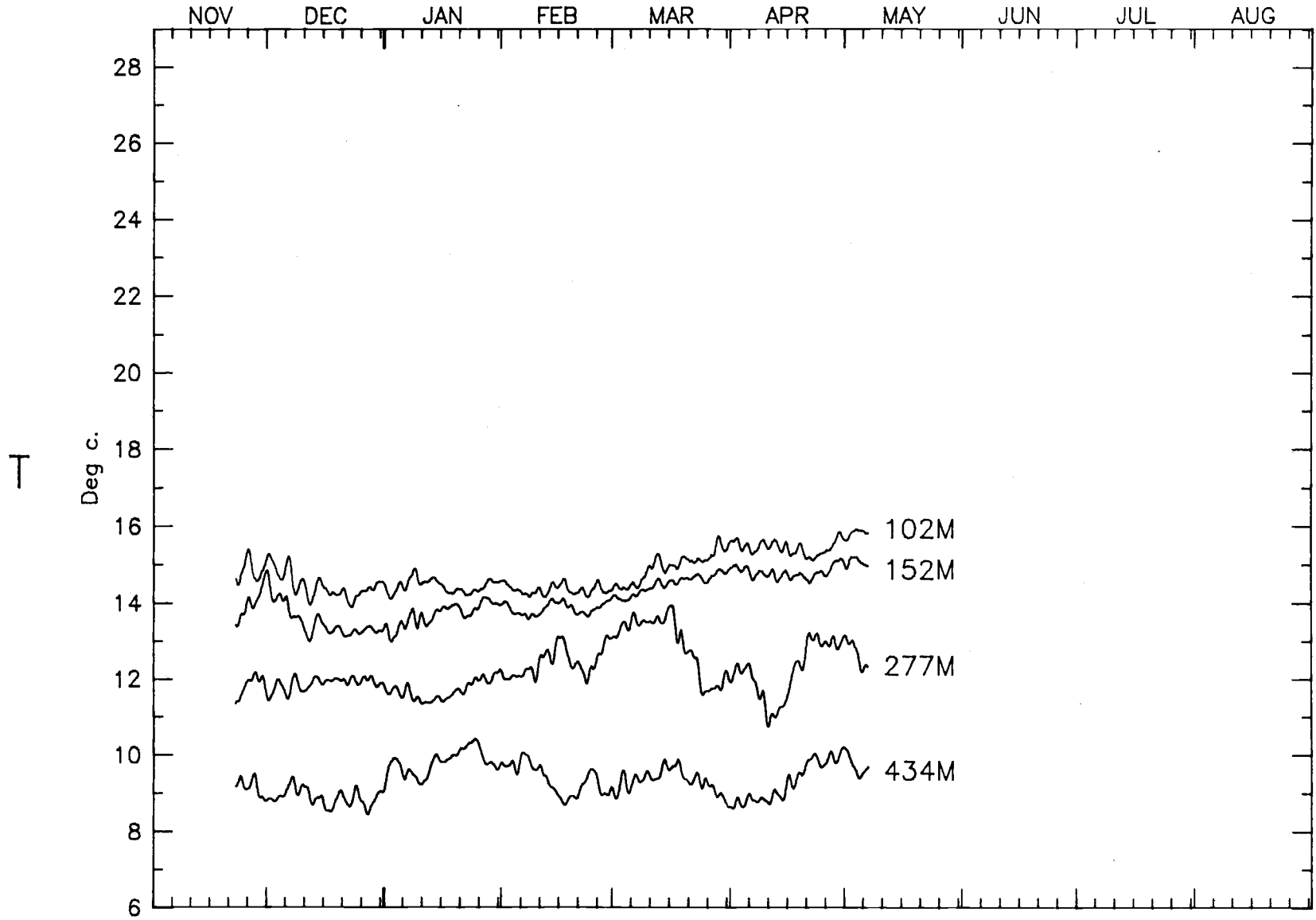


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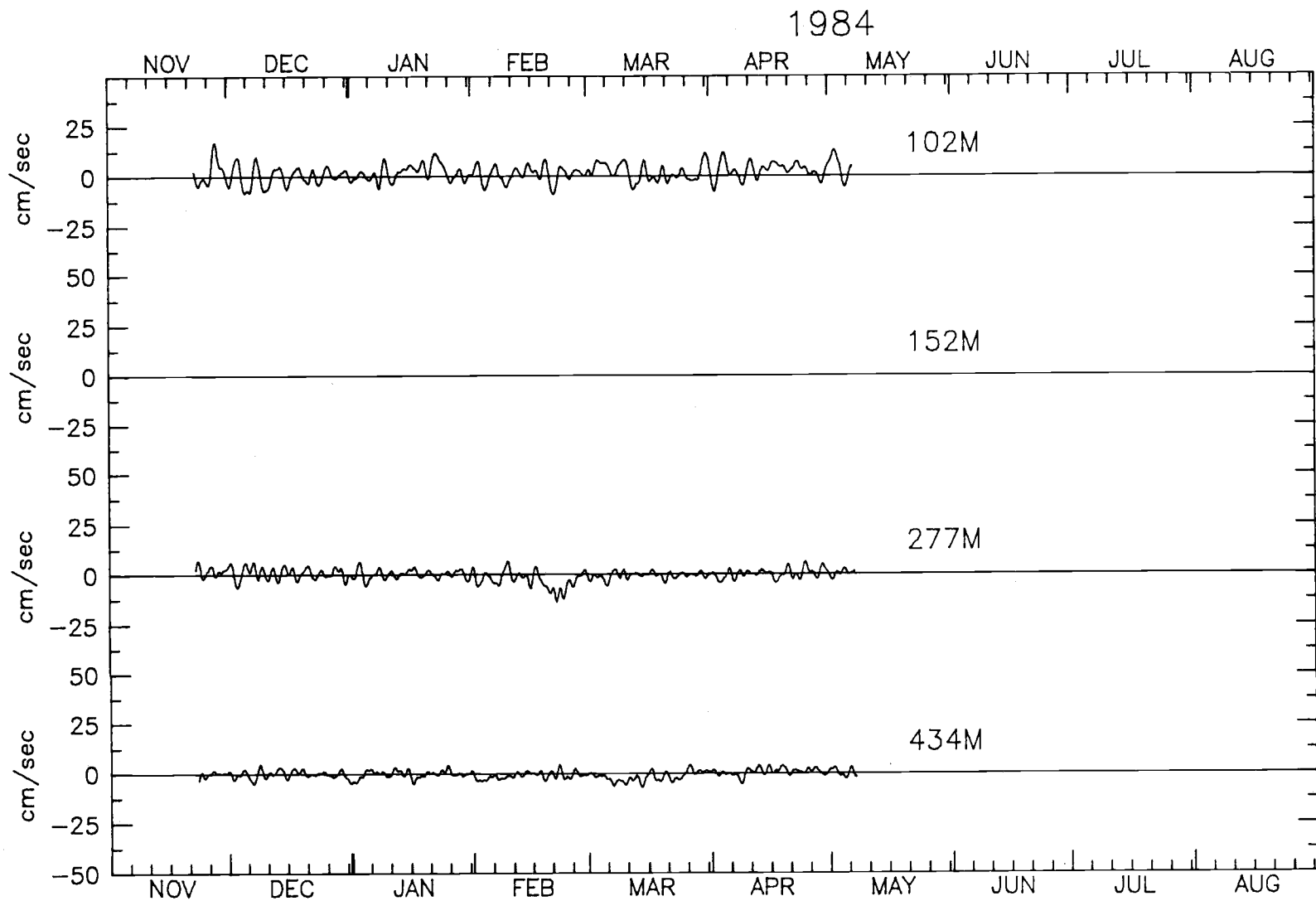
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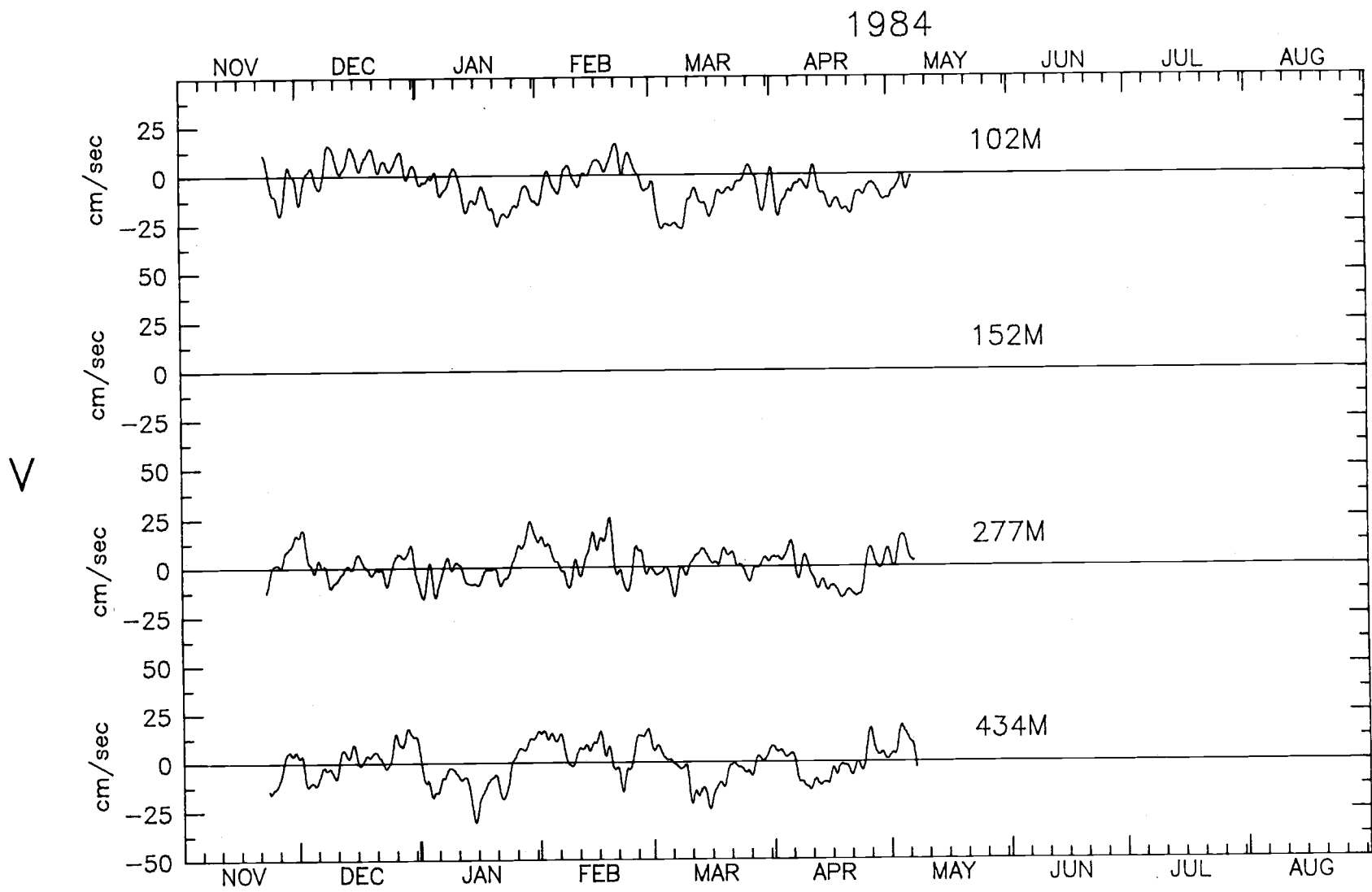


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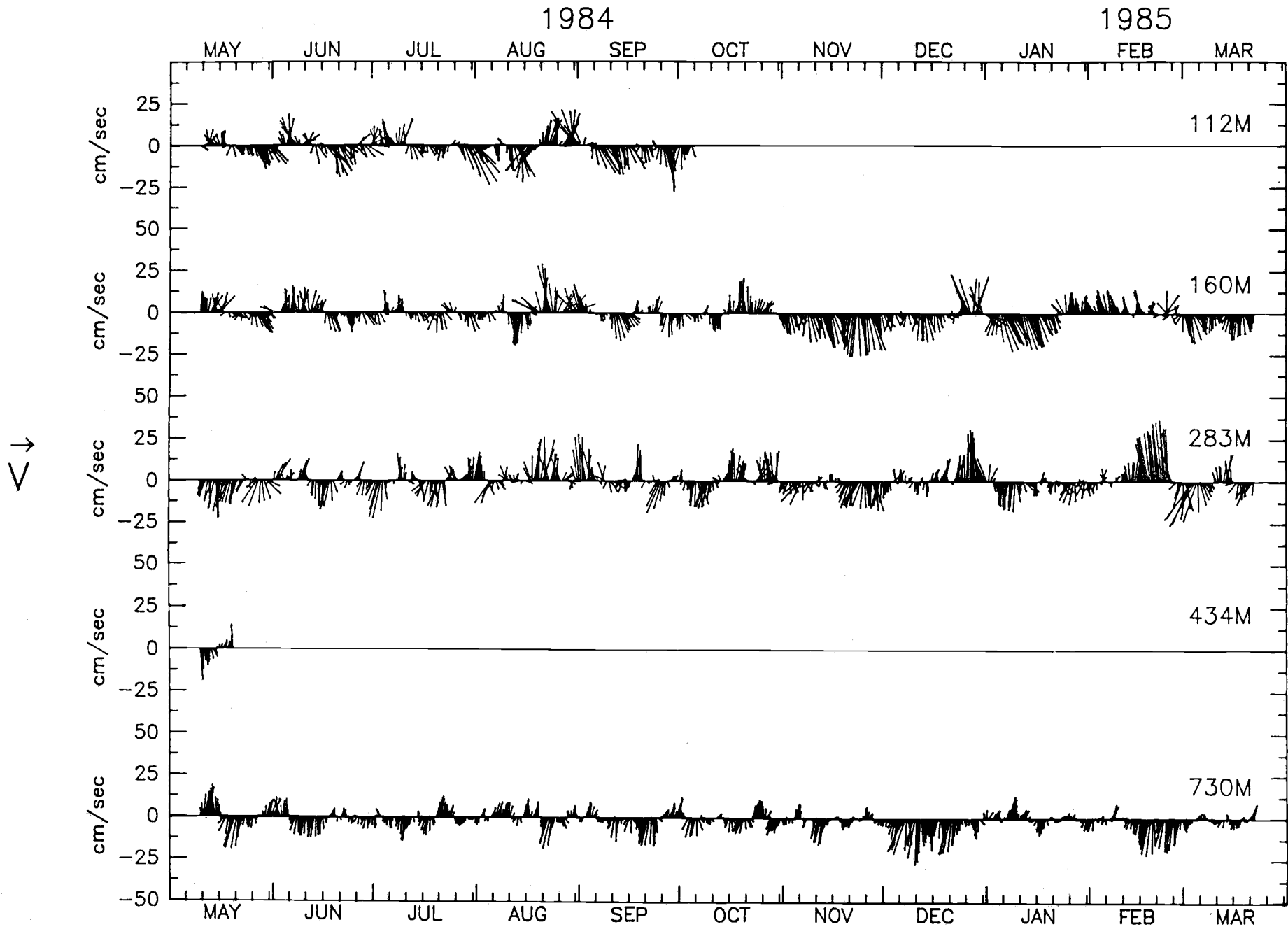
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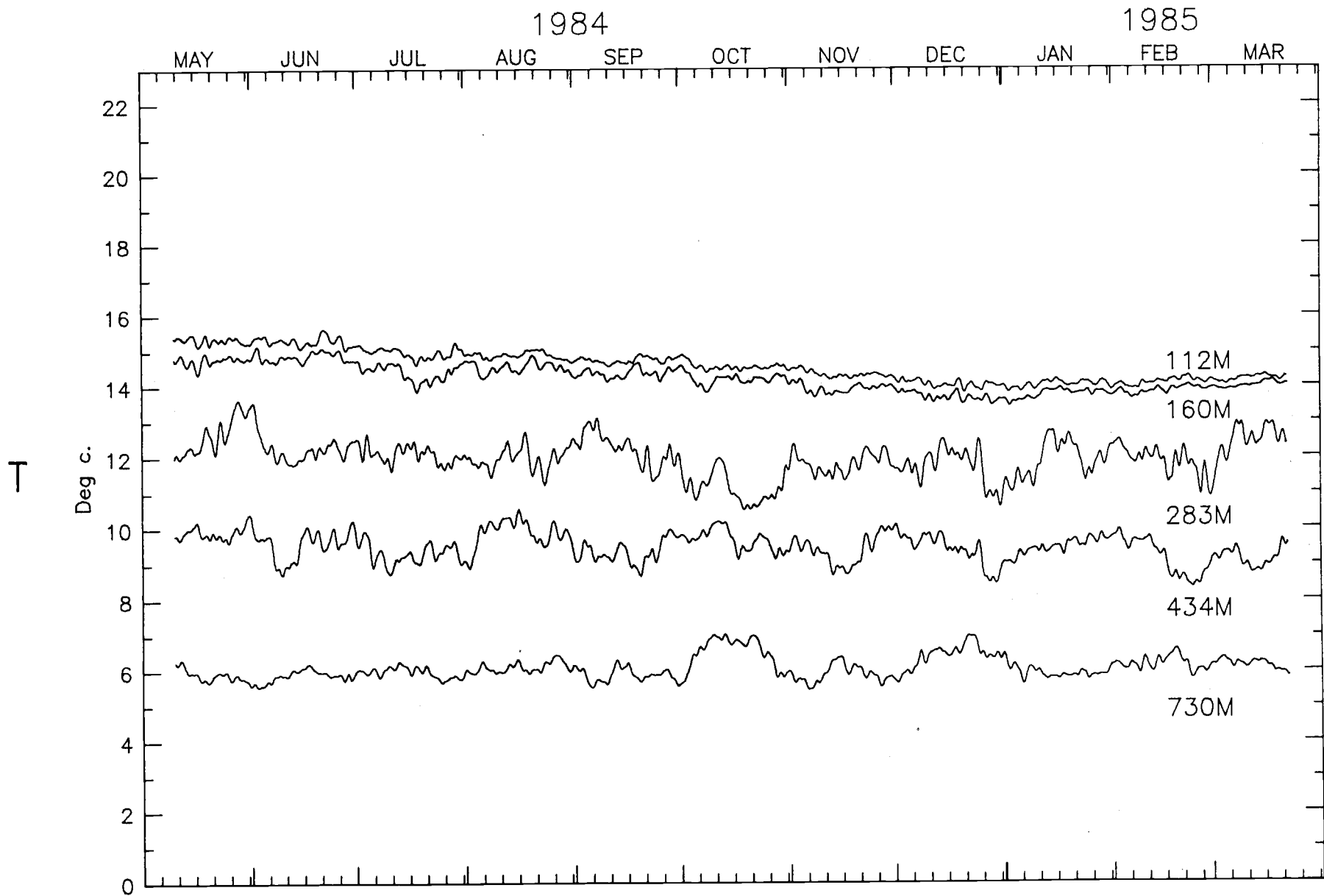
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5 South Slope Period V



5 South Slope Period VI



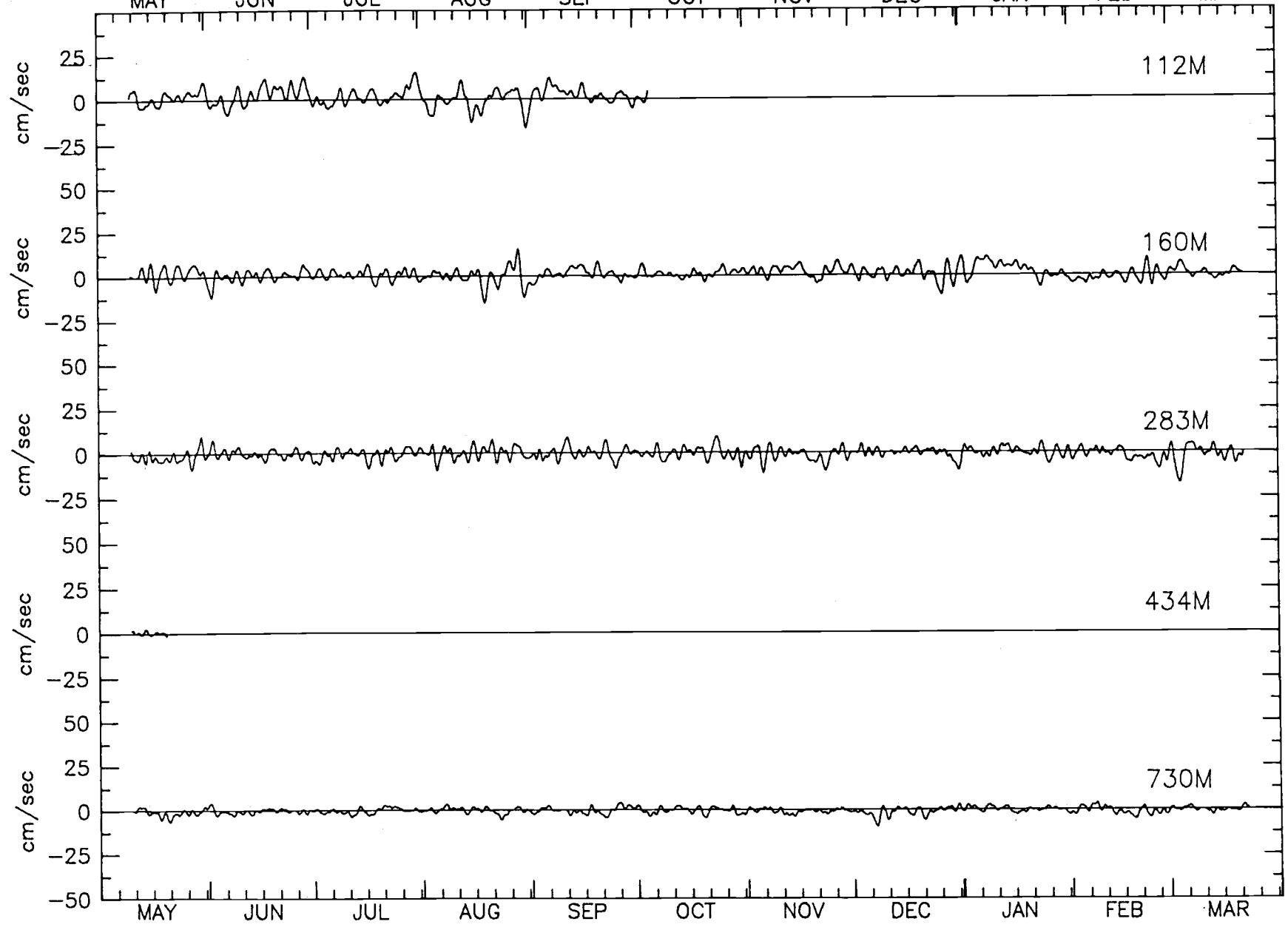
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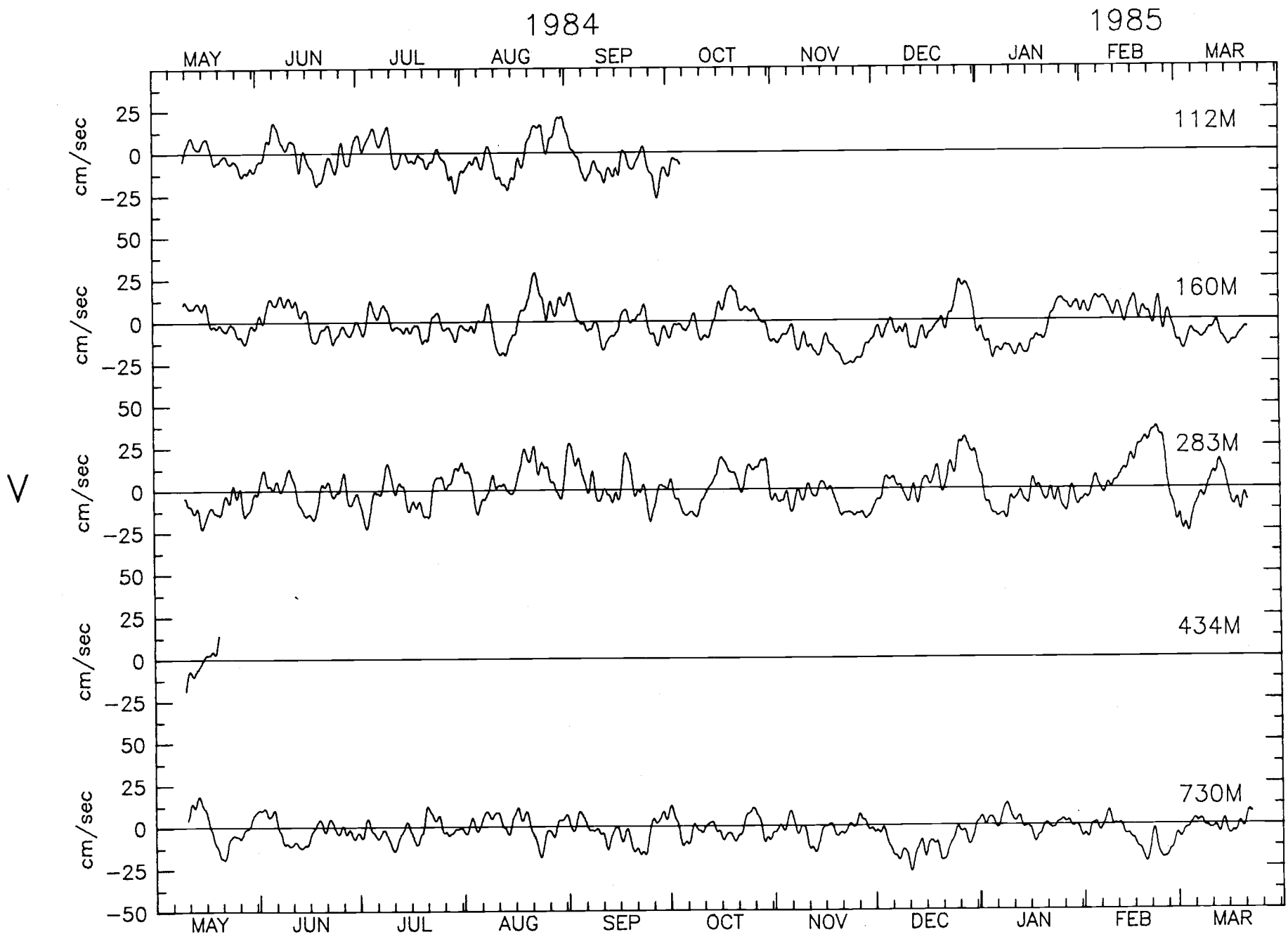
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MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR

U

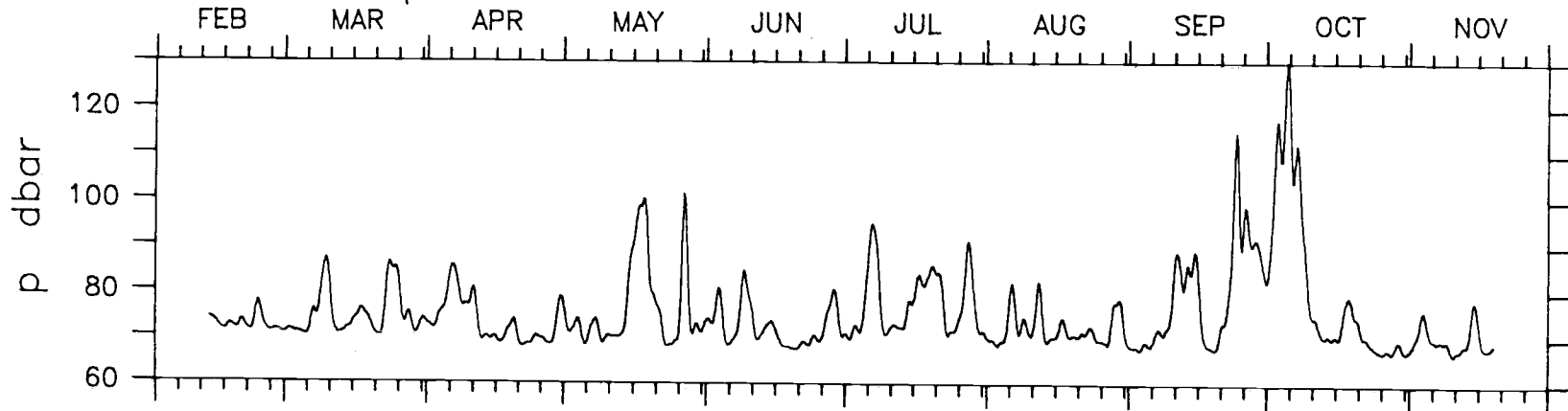


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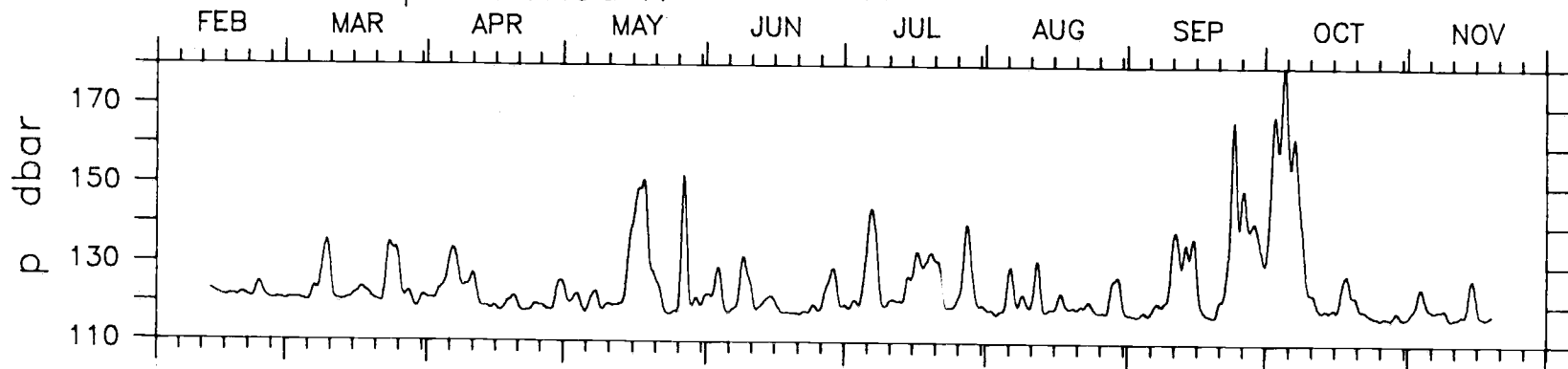


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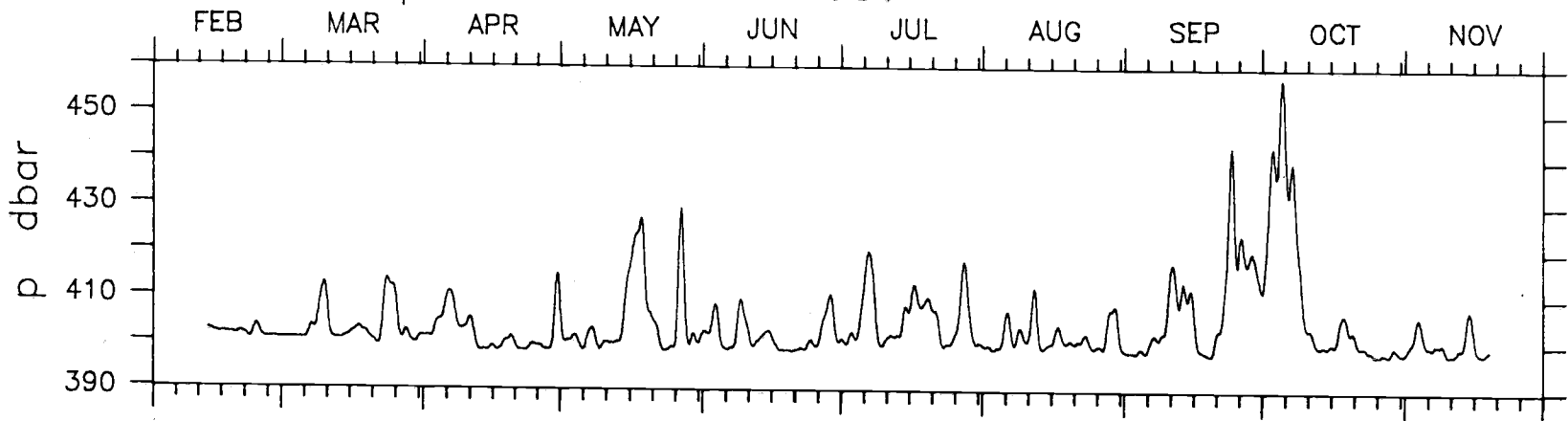
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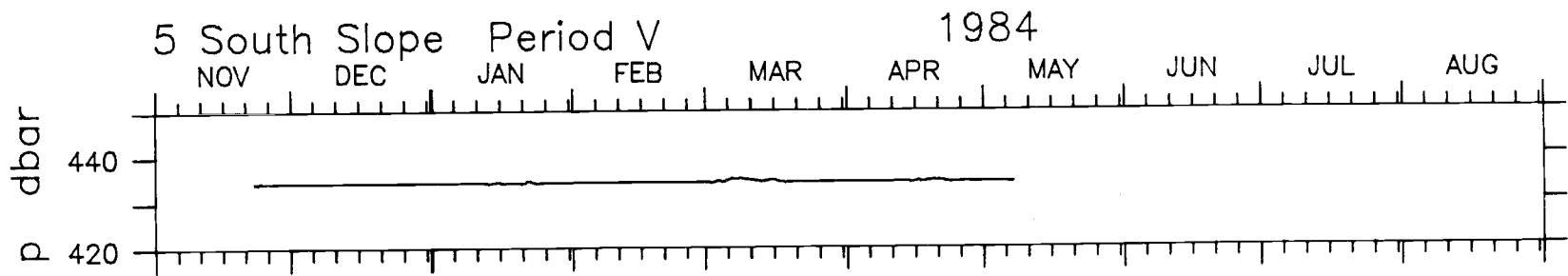
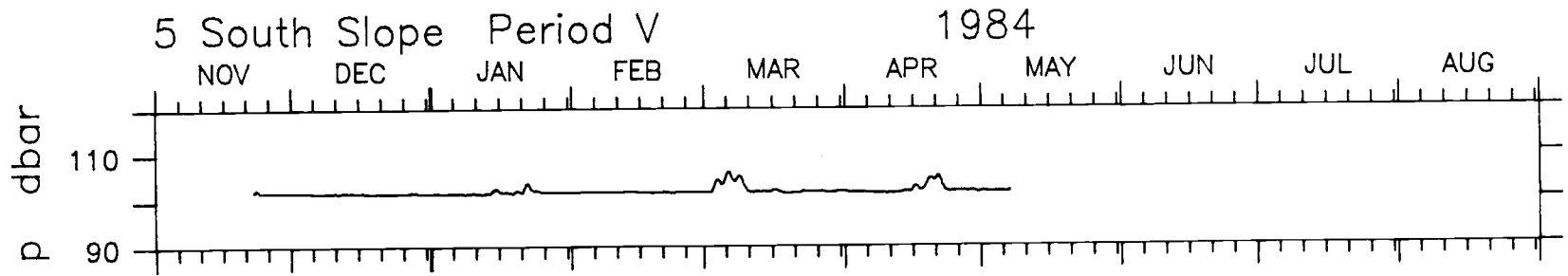


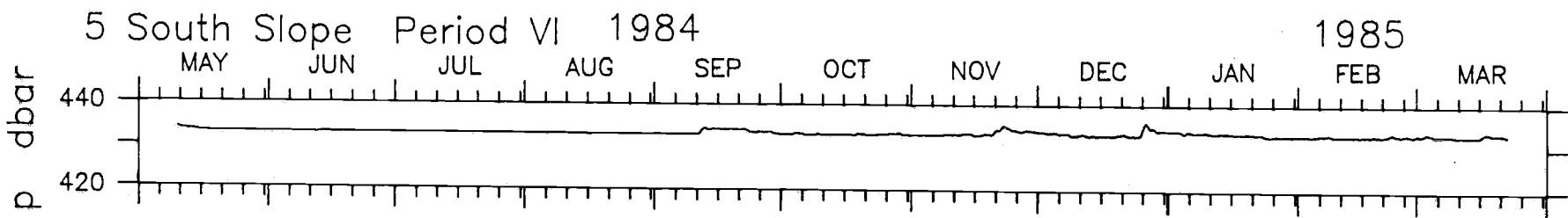
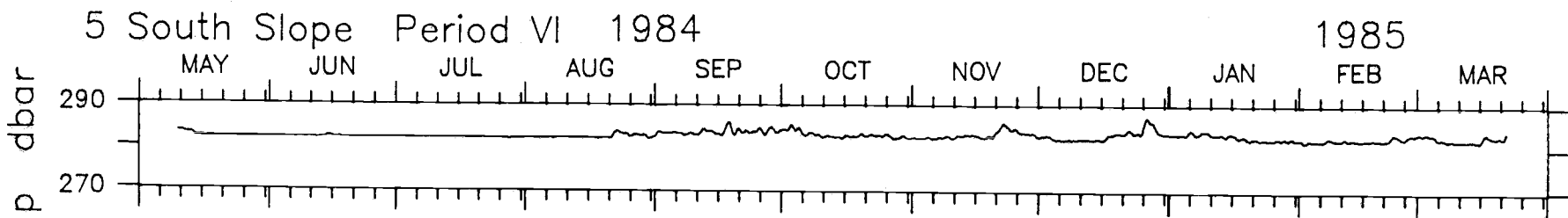
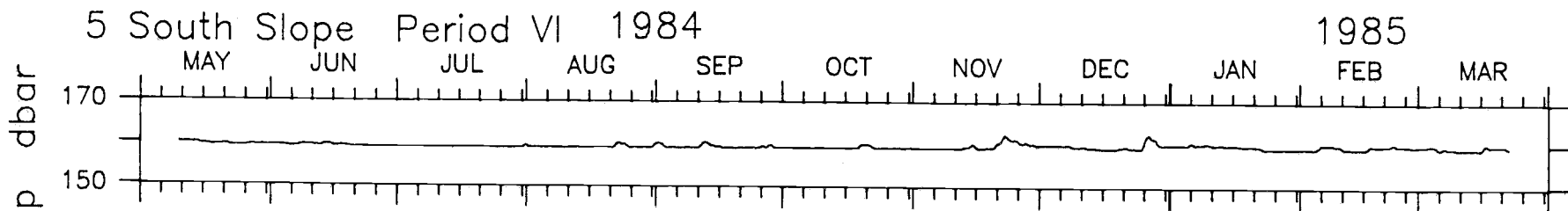
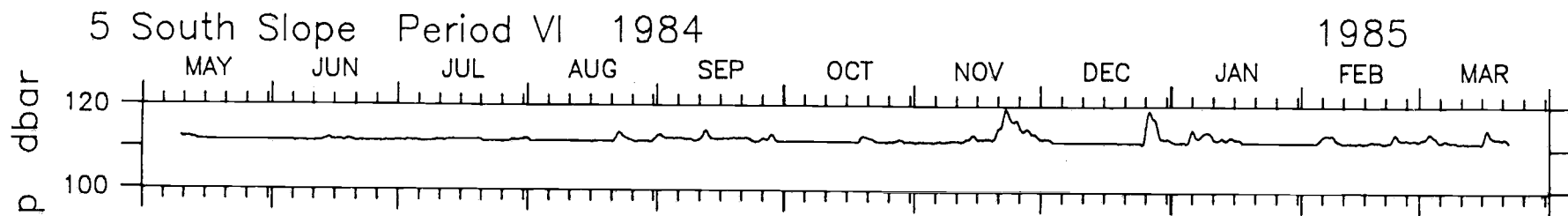
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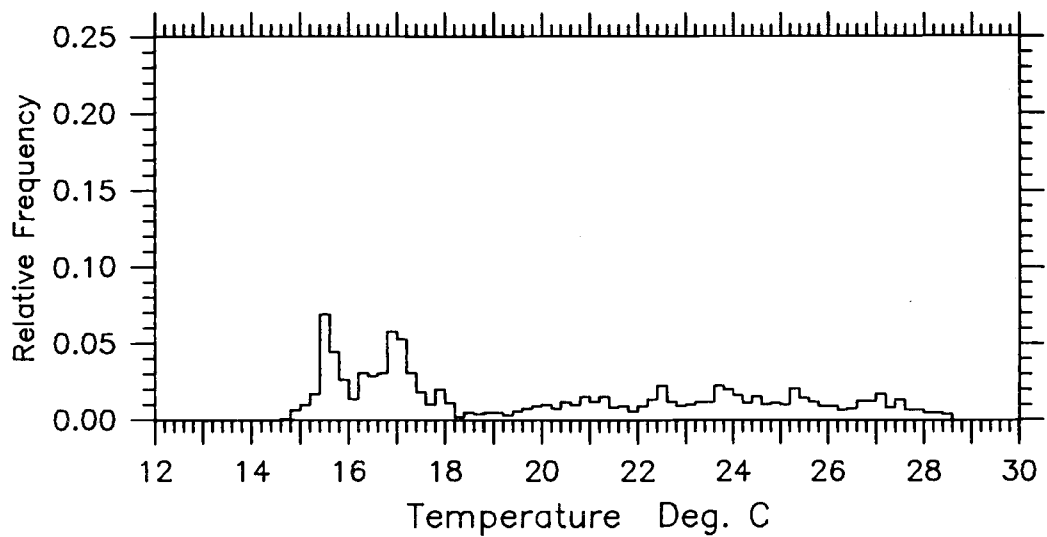
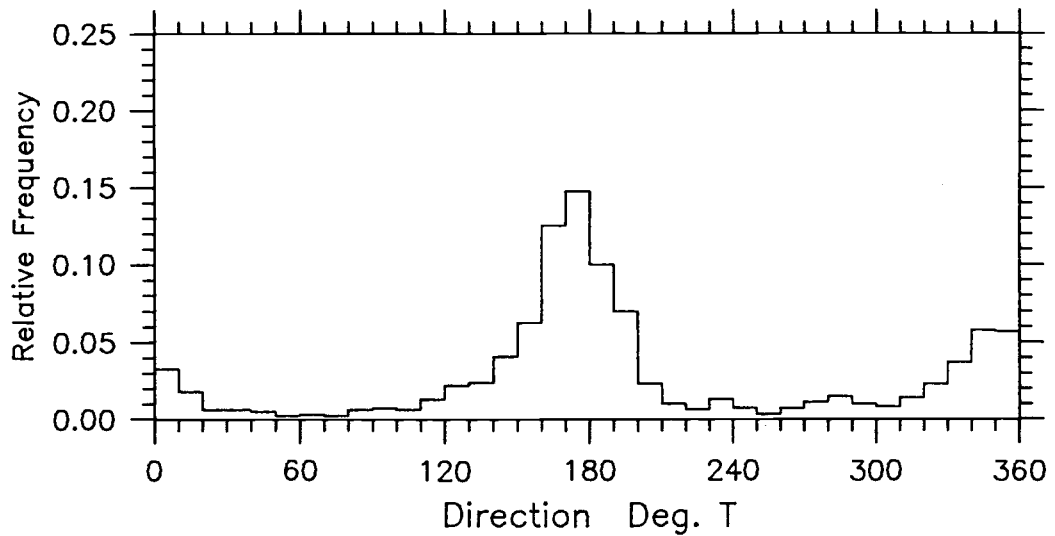
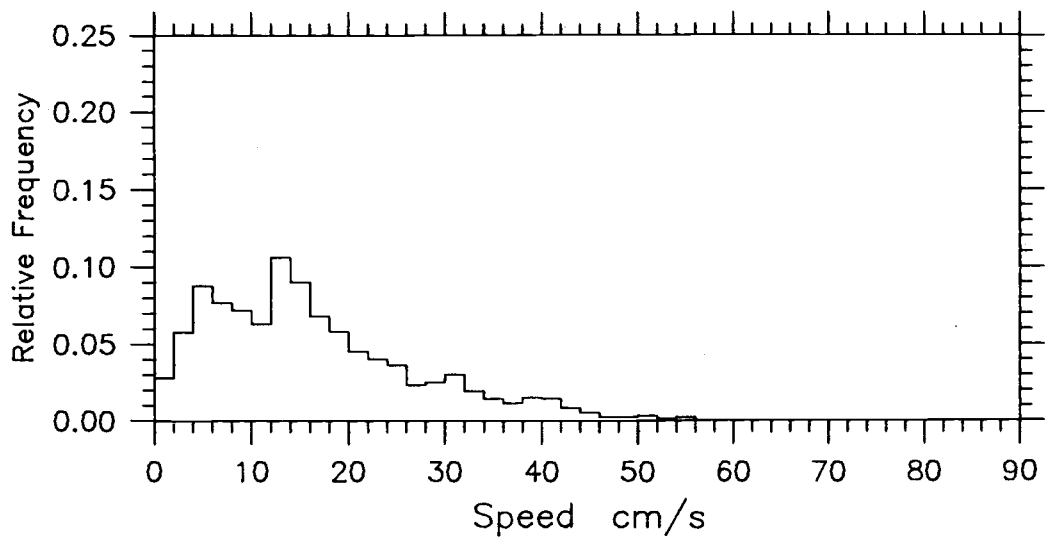


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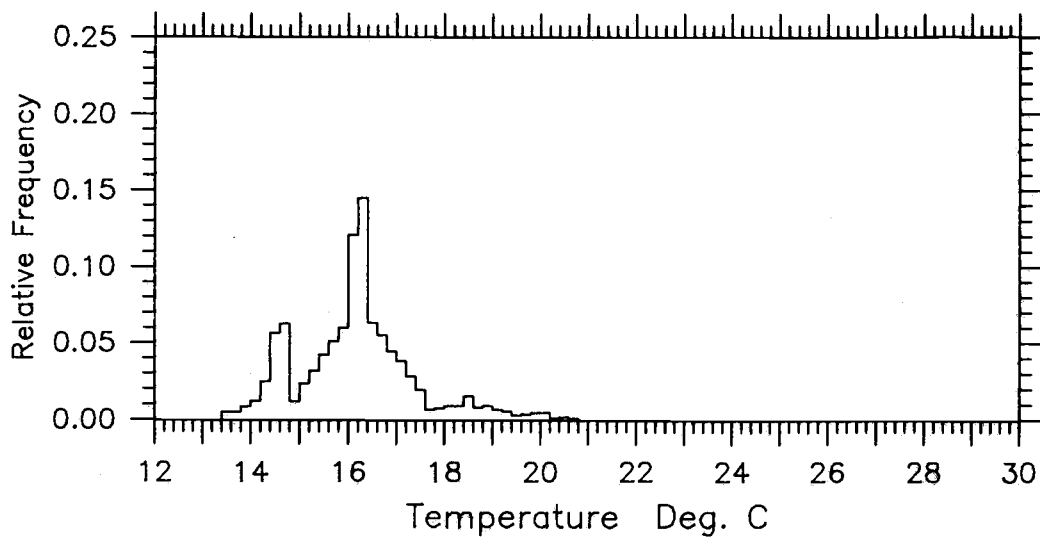
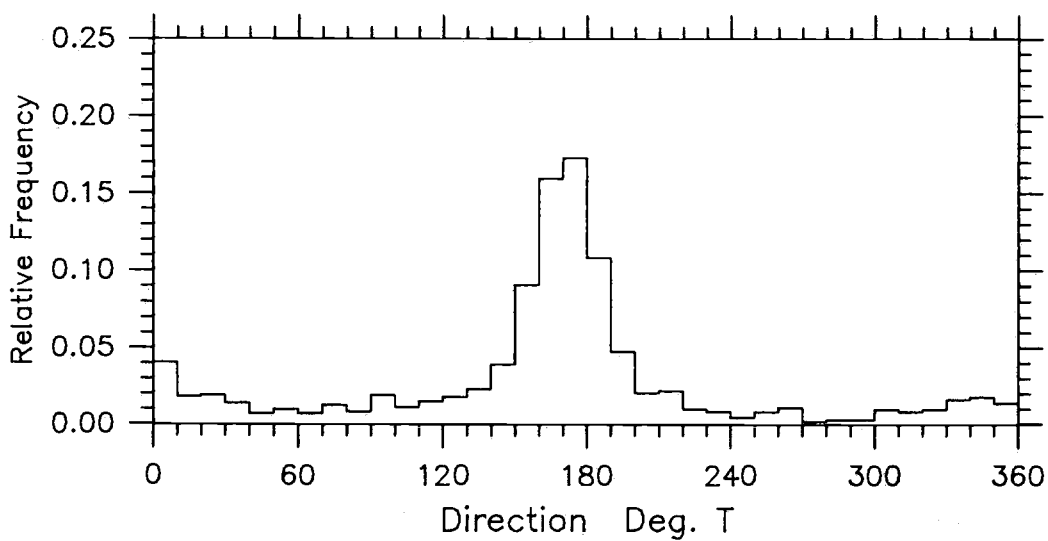
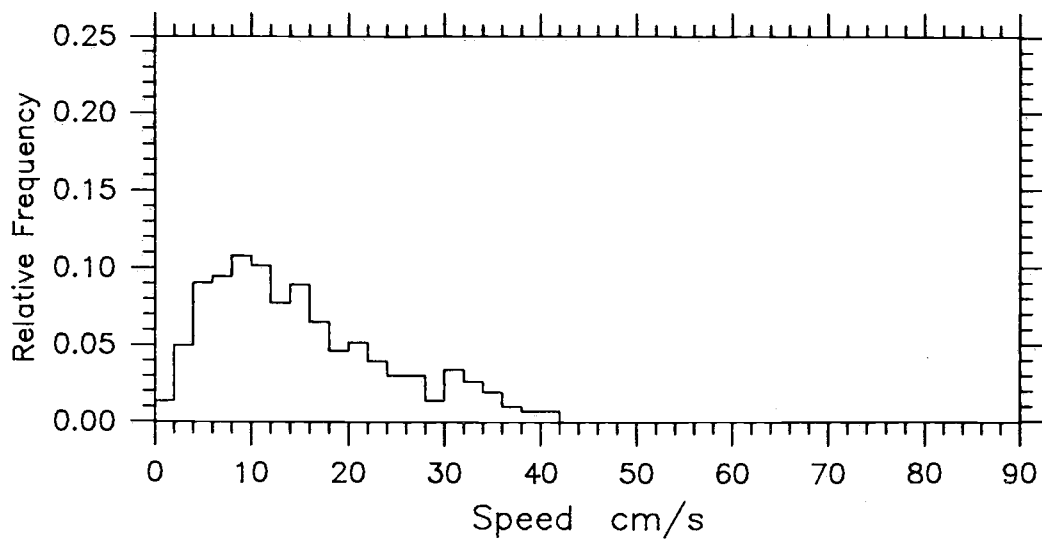




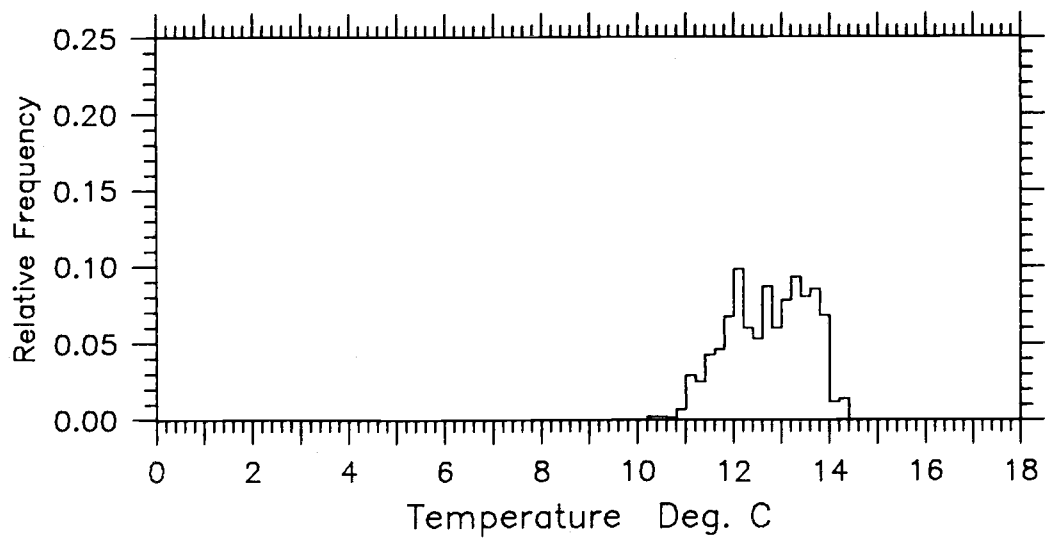
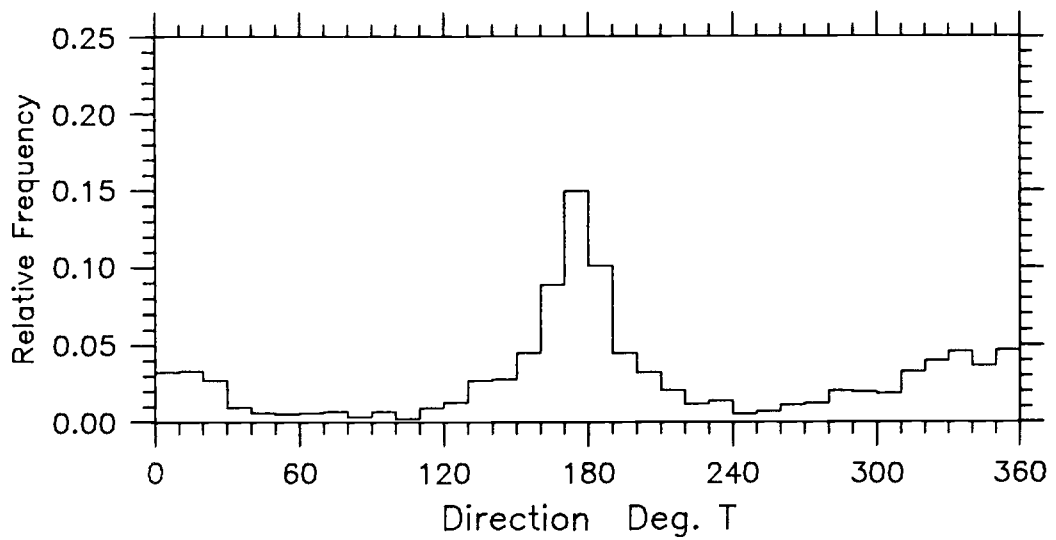
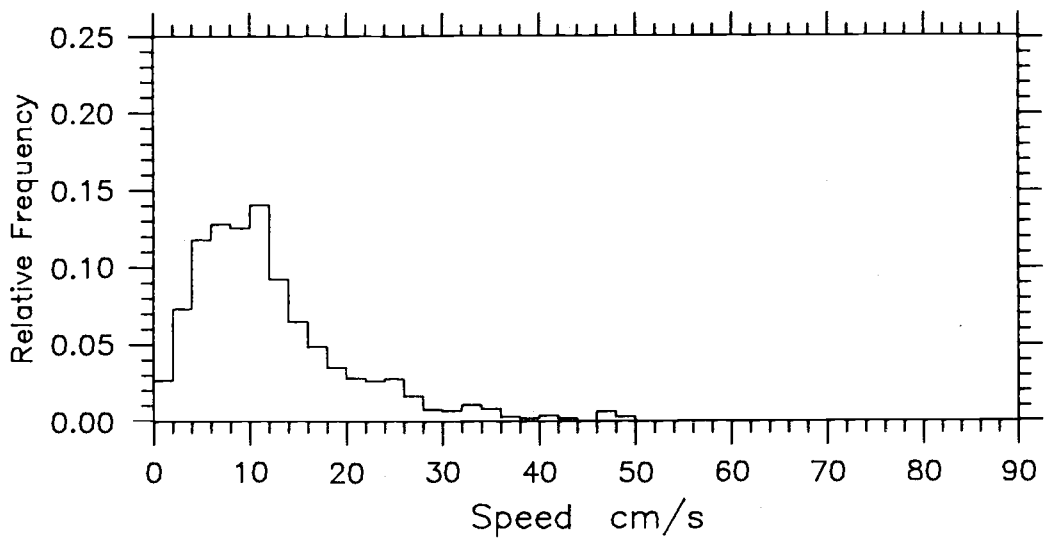




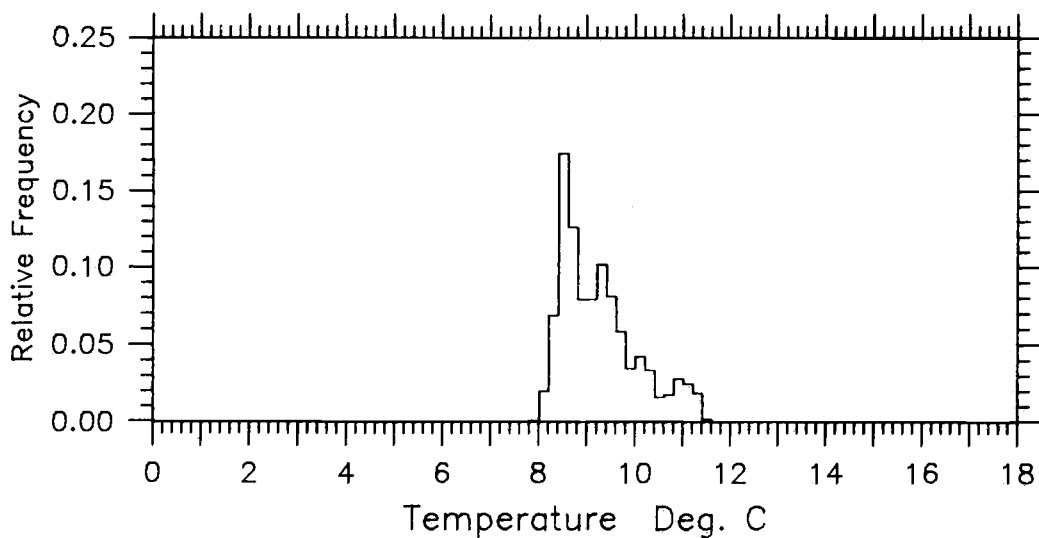
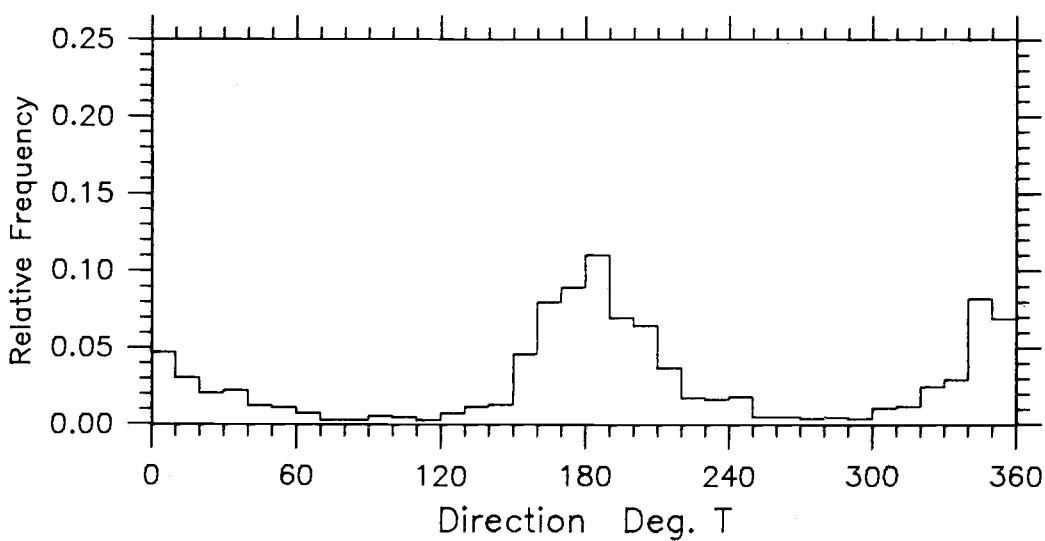
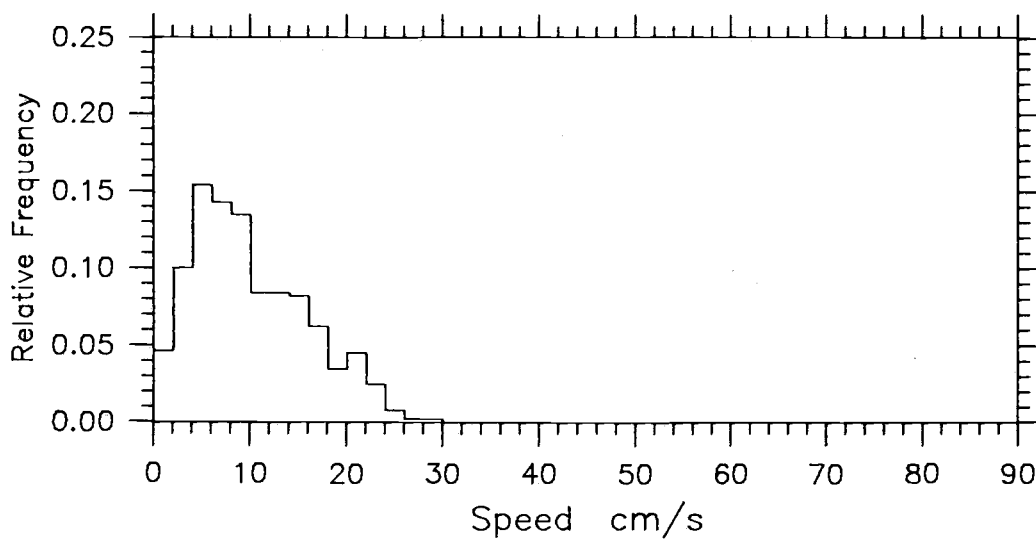
5 South Slope Period IV 70m



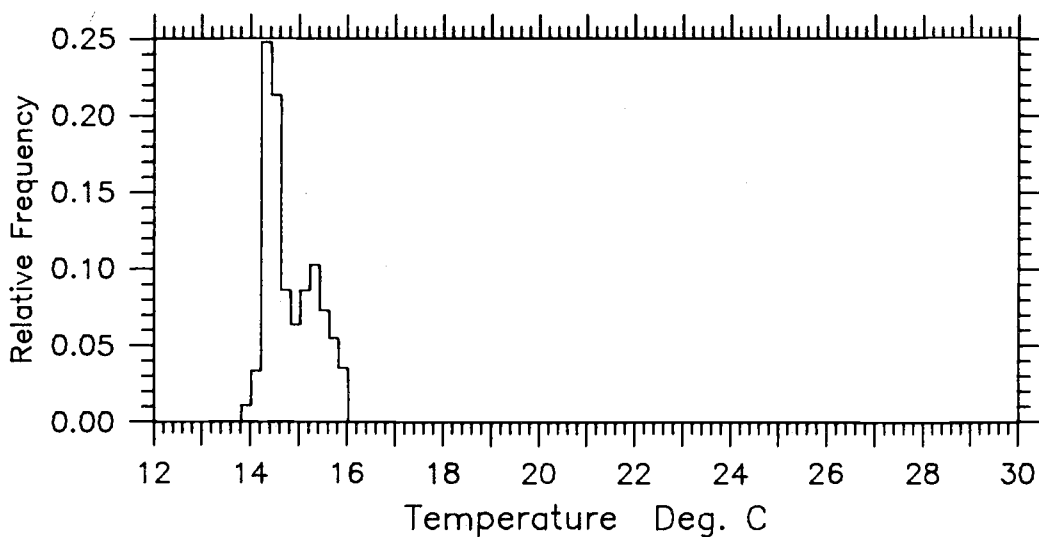
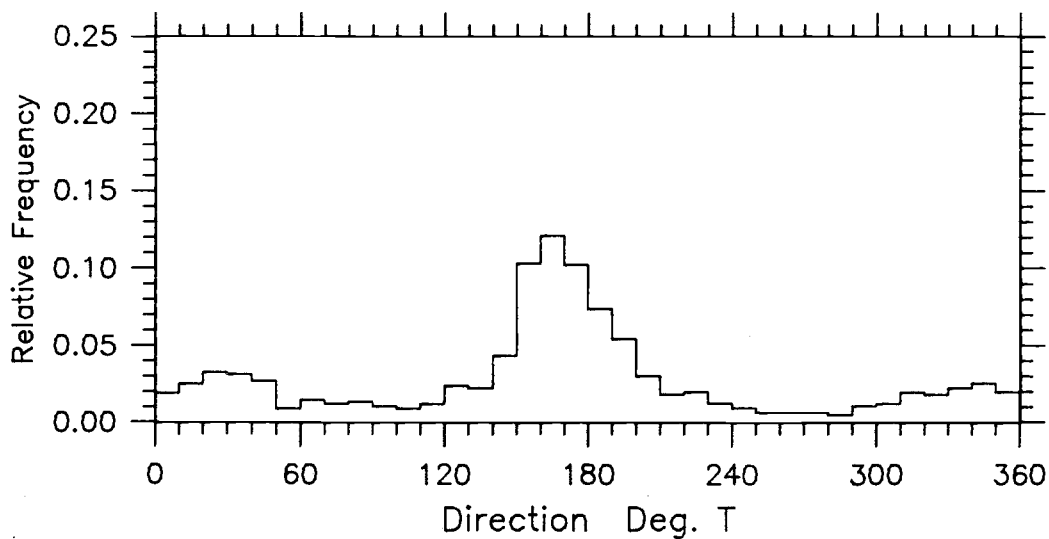
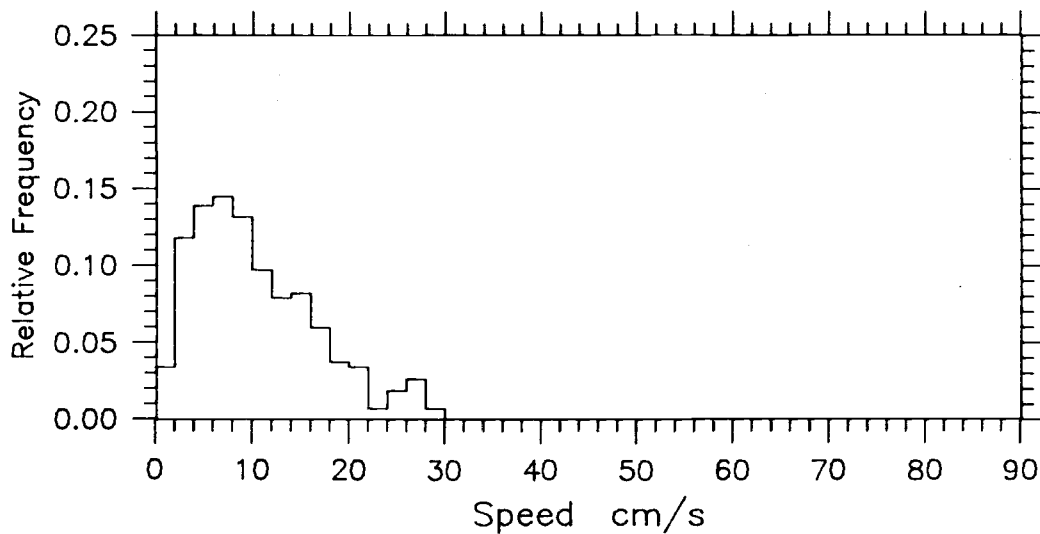
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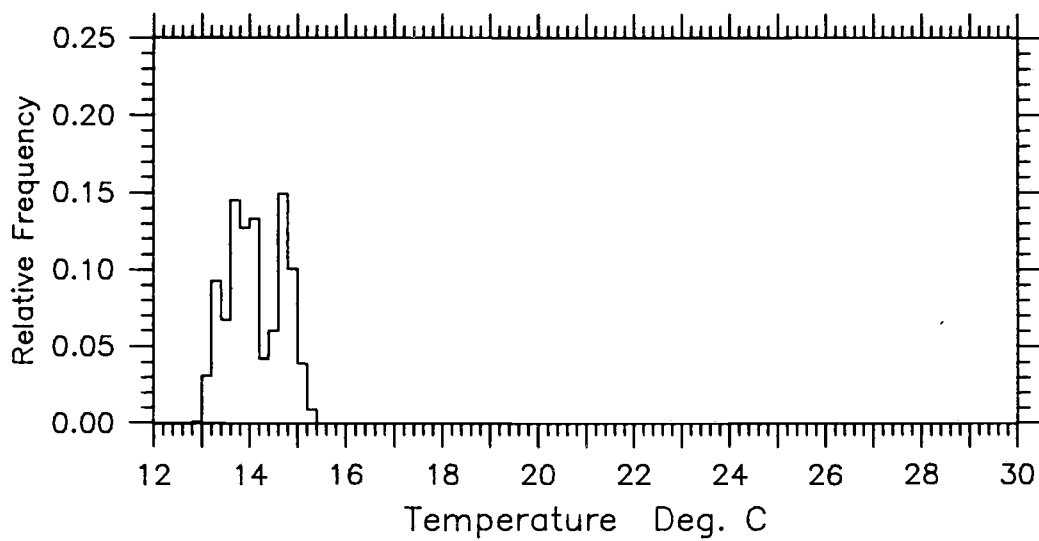
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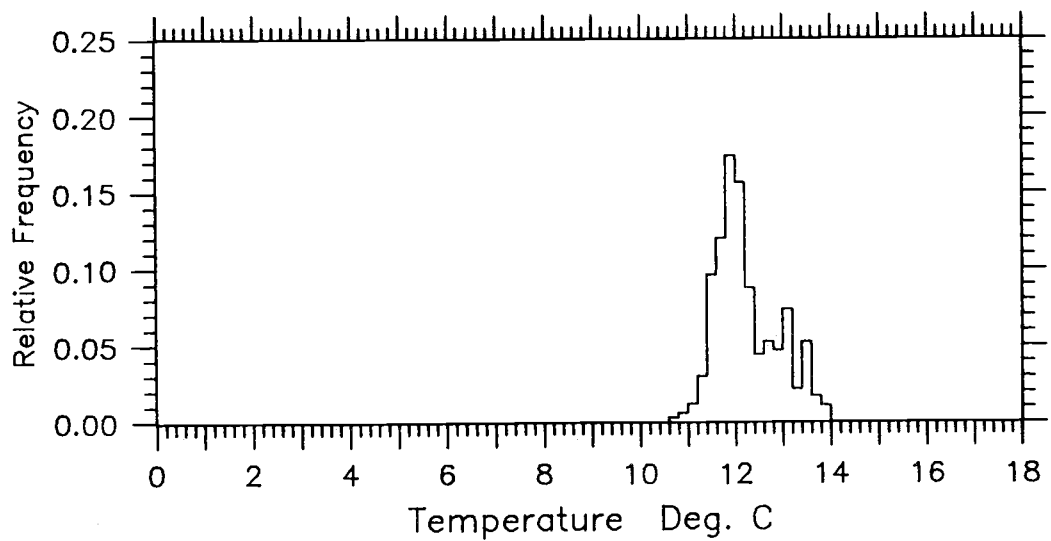
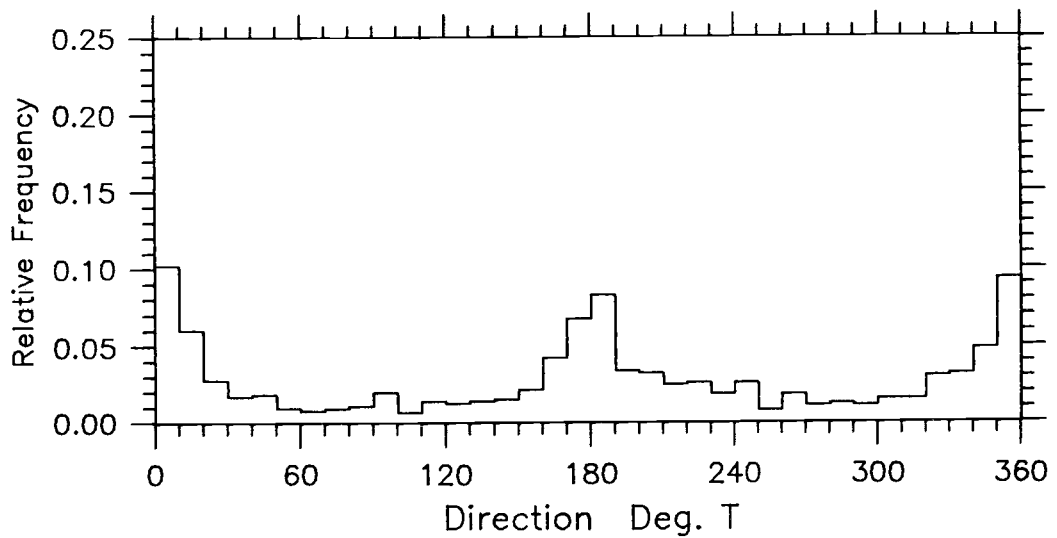
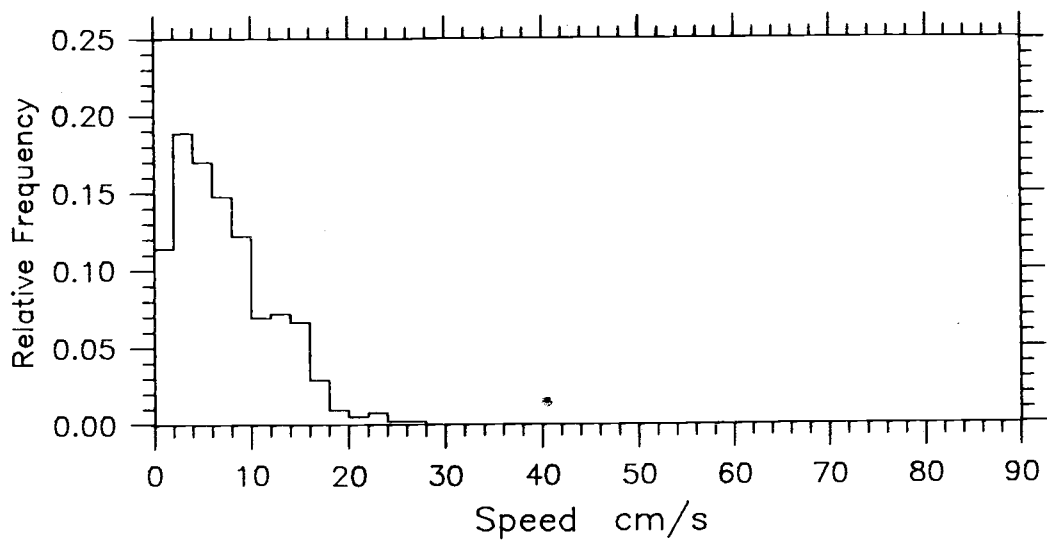
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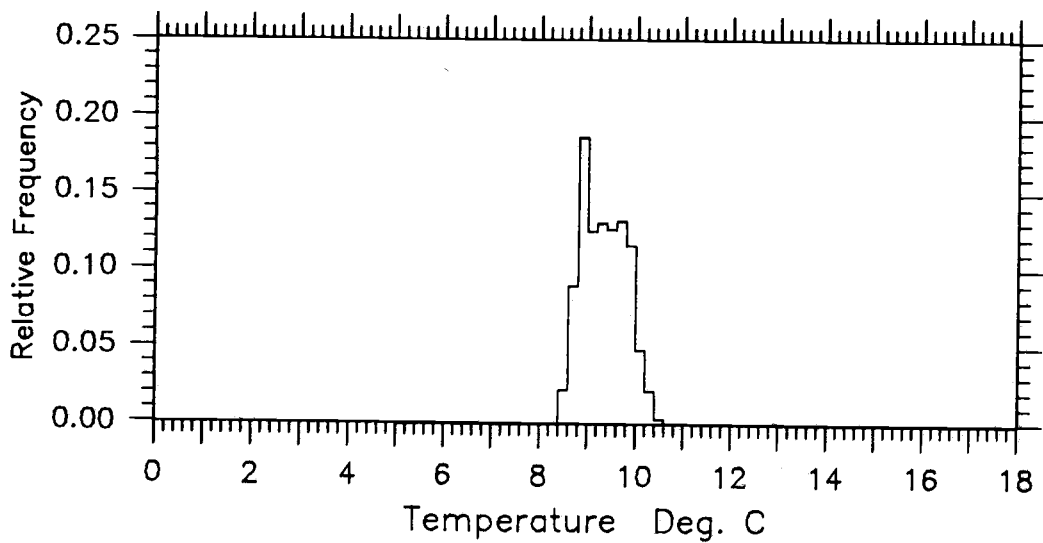
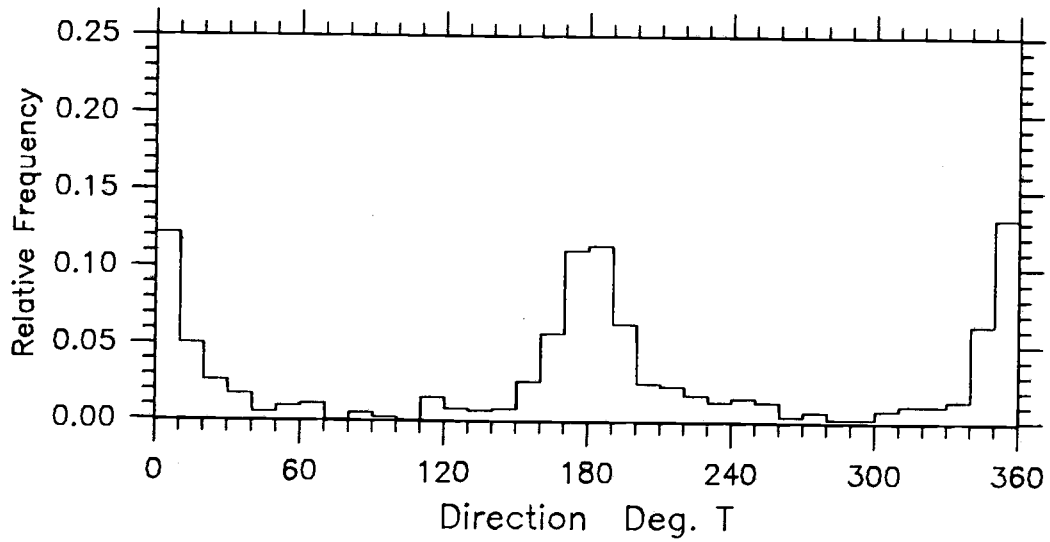
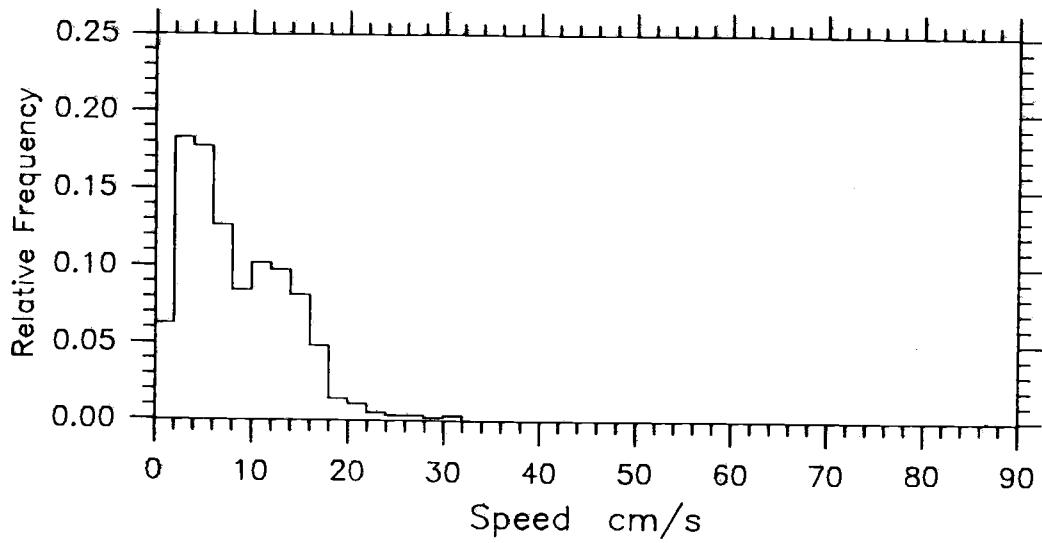
5 South Slope Period V 102m



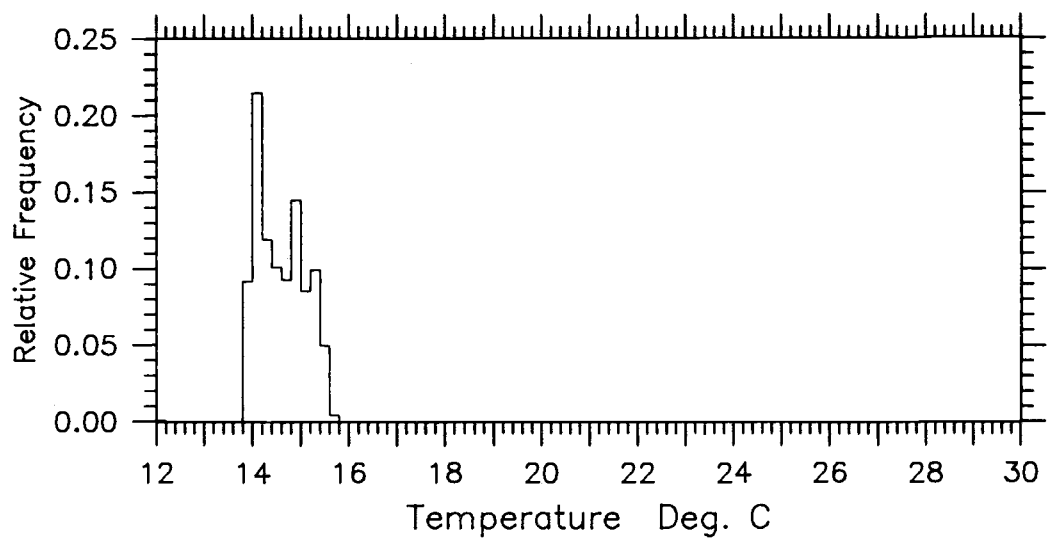
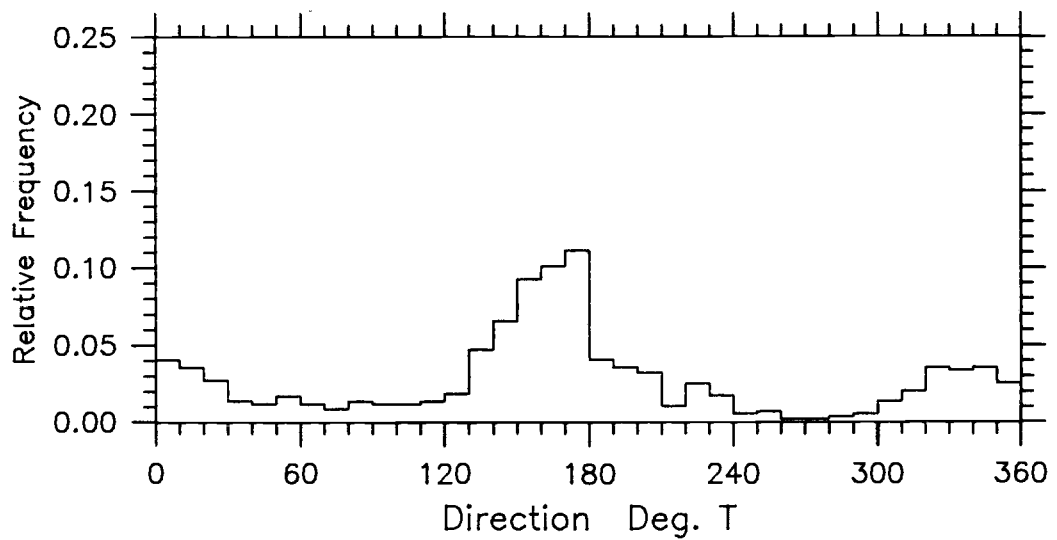
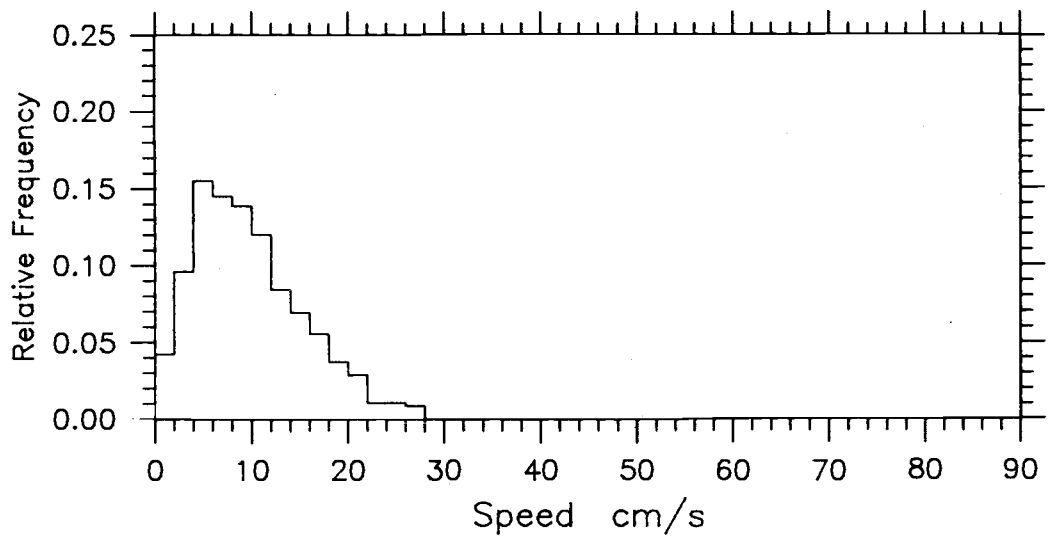
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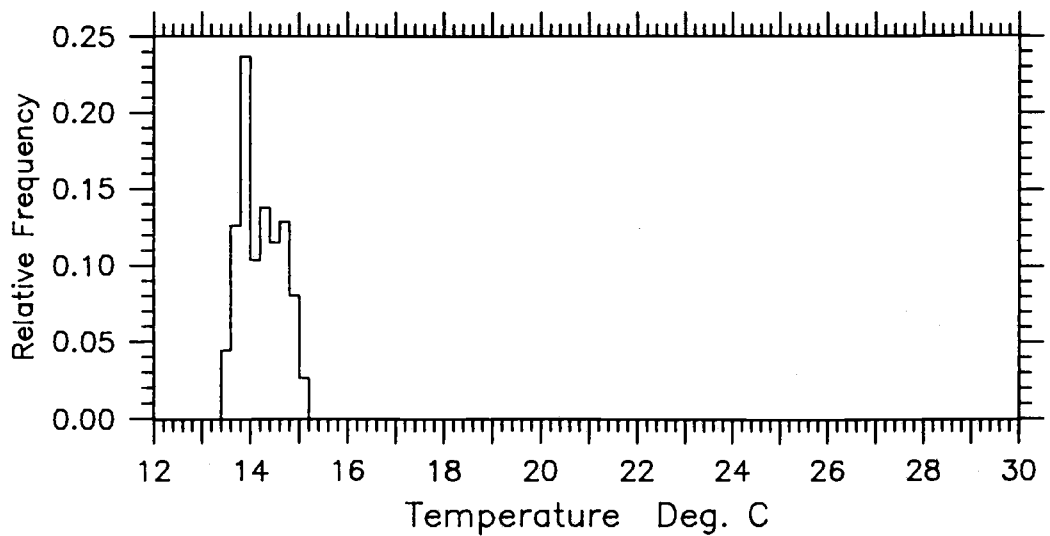
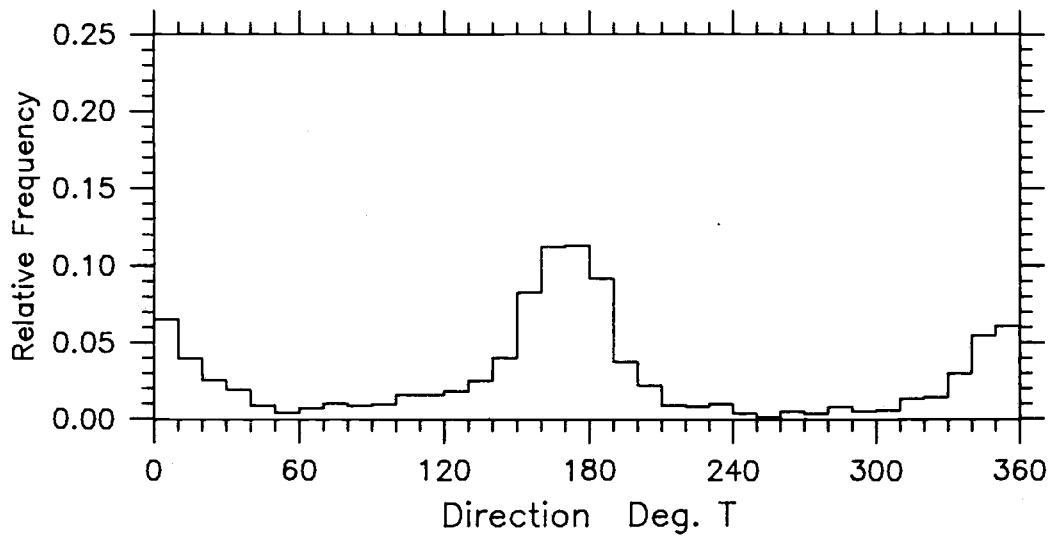
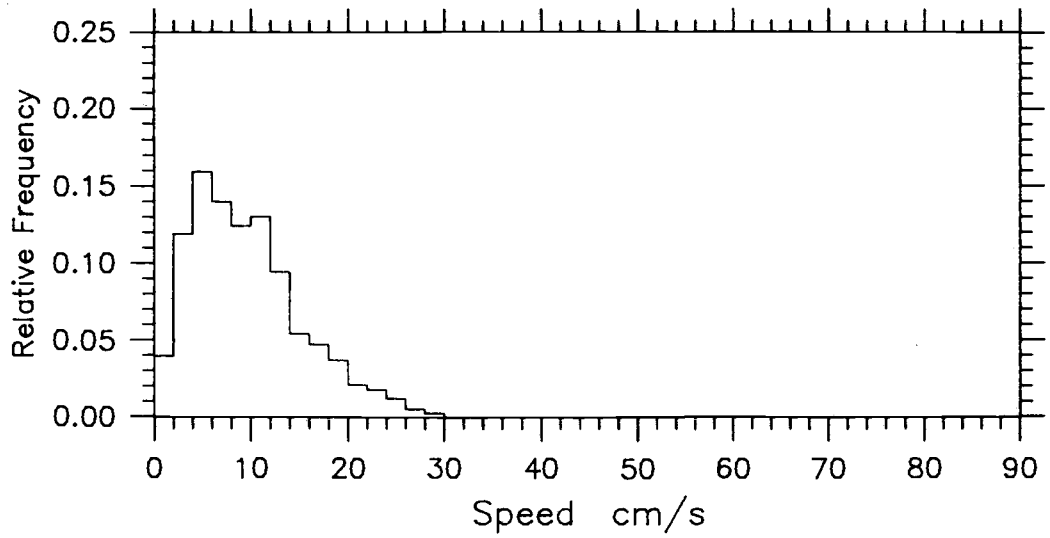
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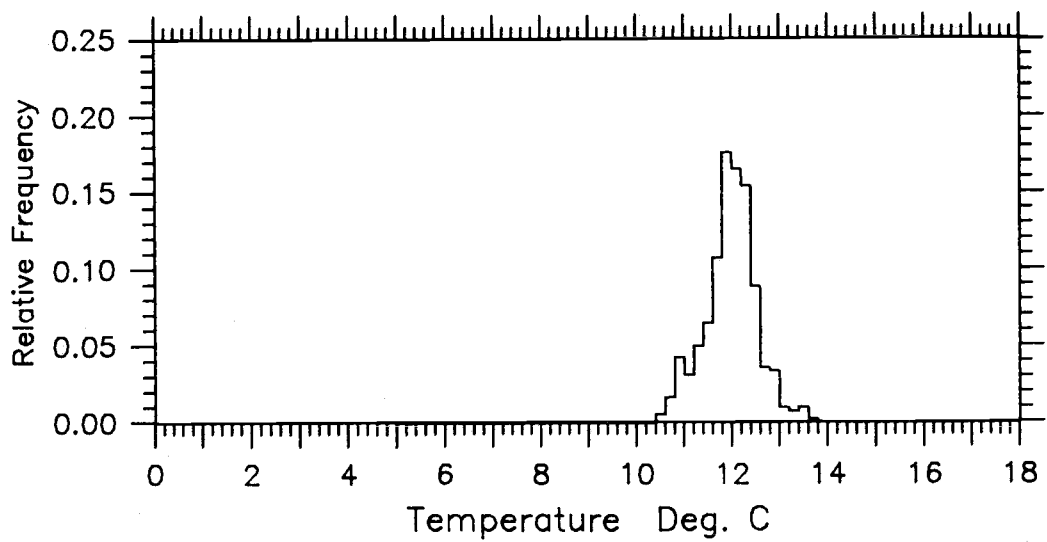
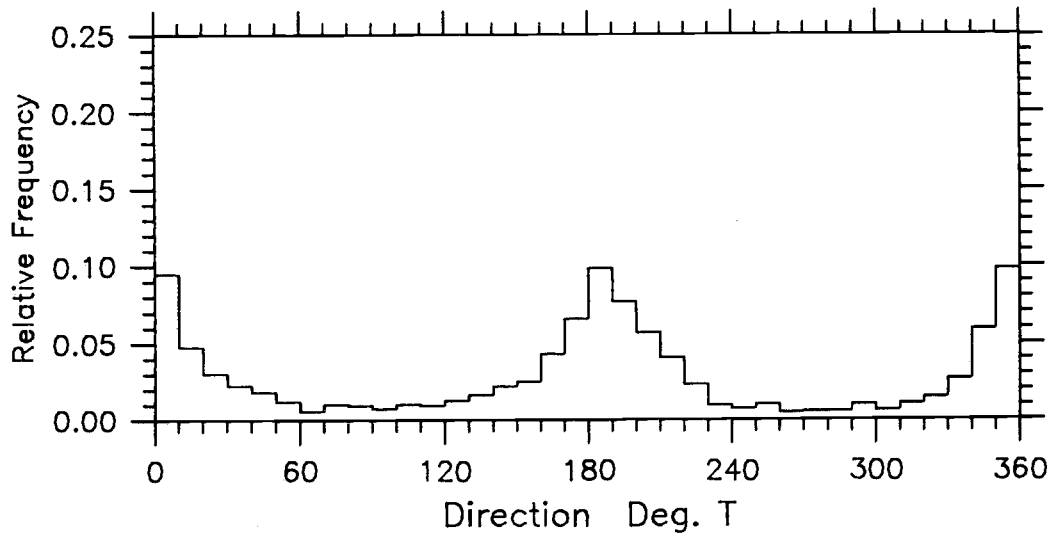
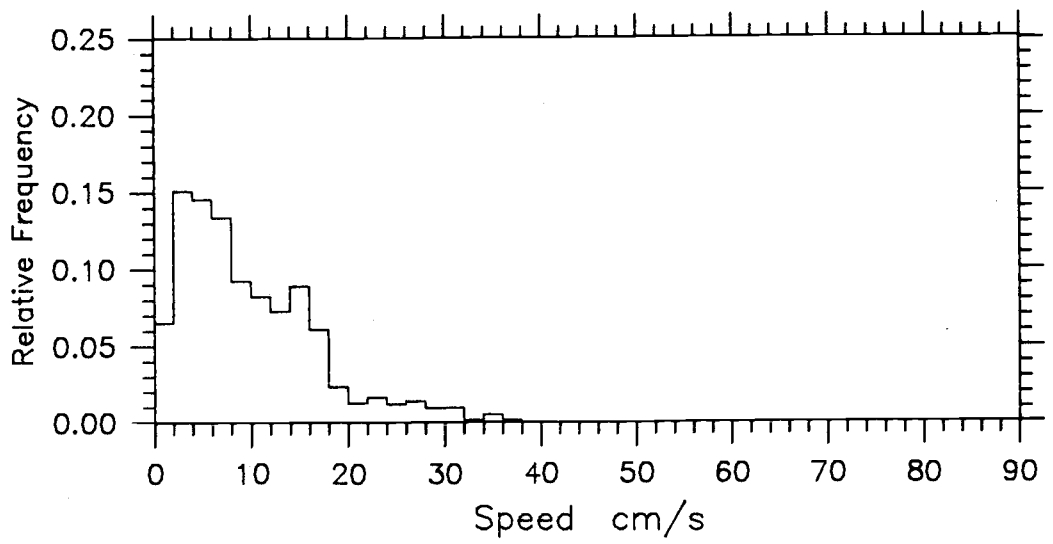
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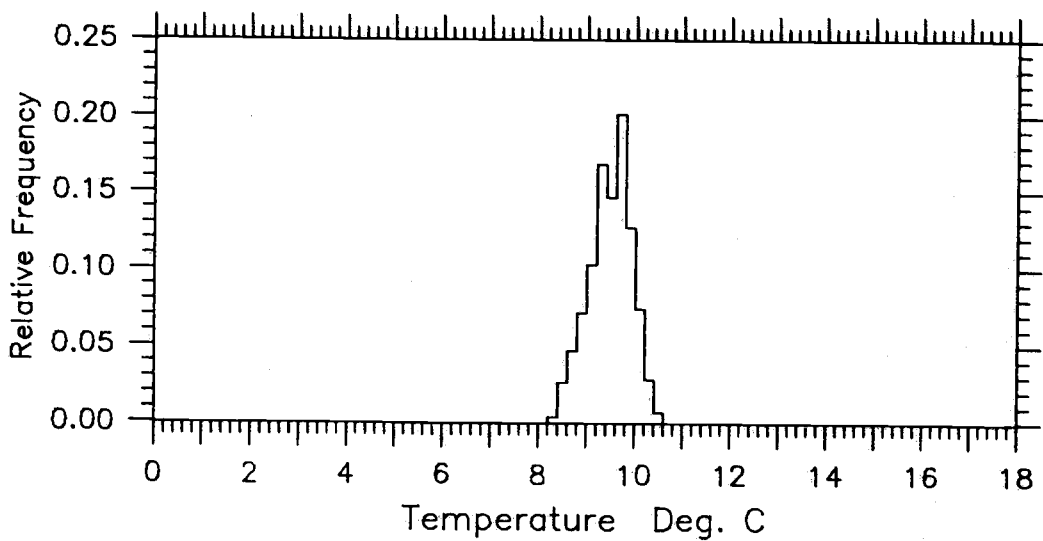
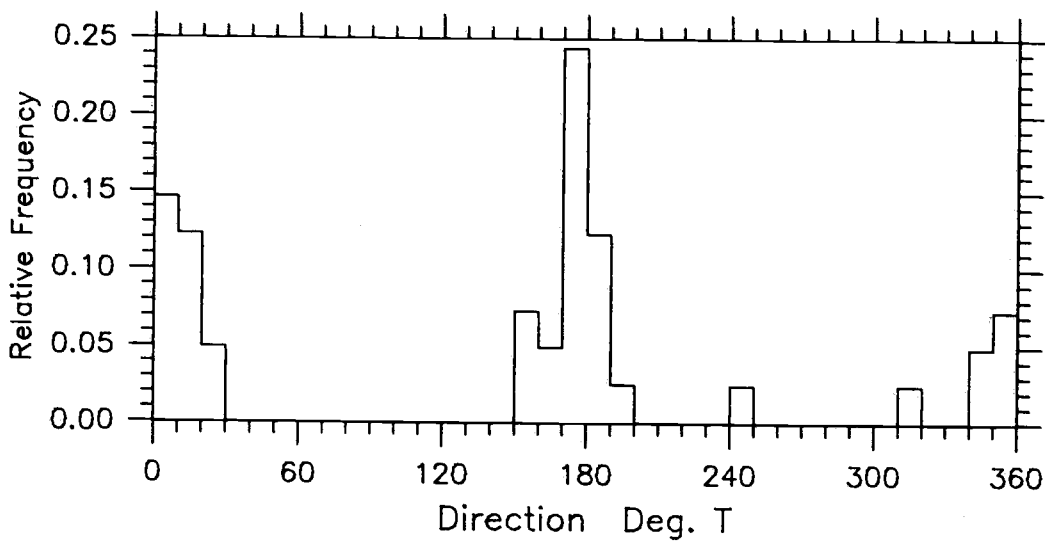
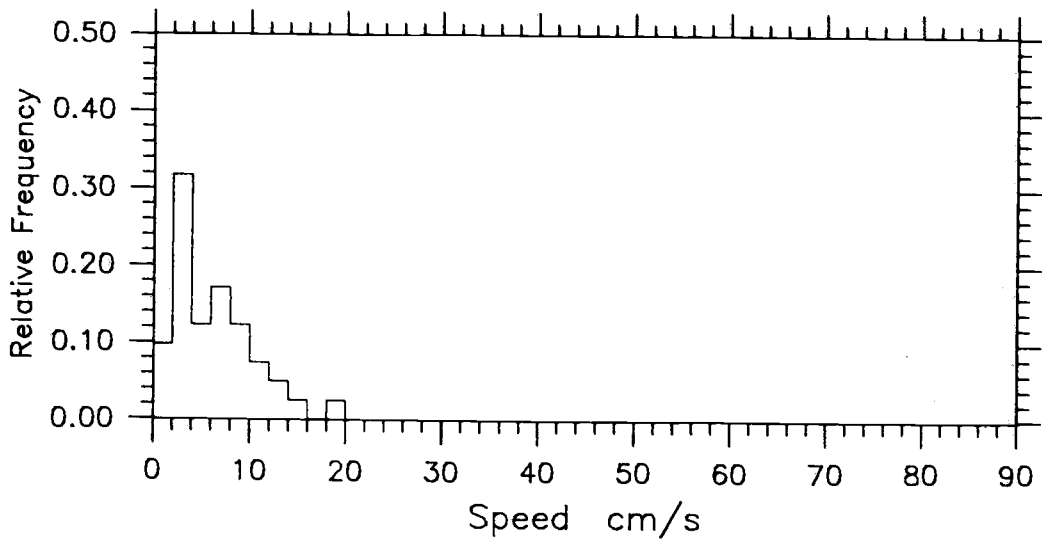
5 South Slope Period VI 112m



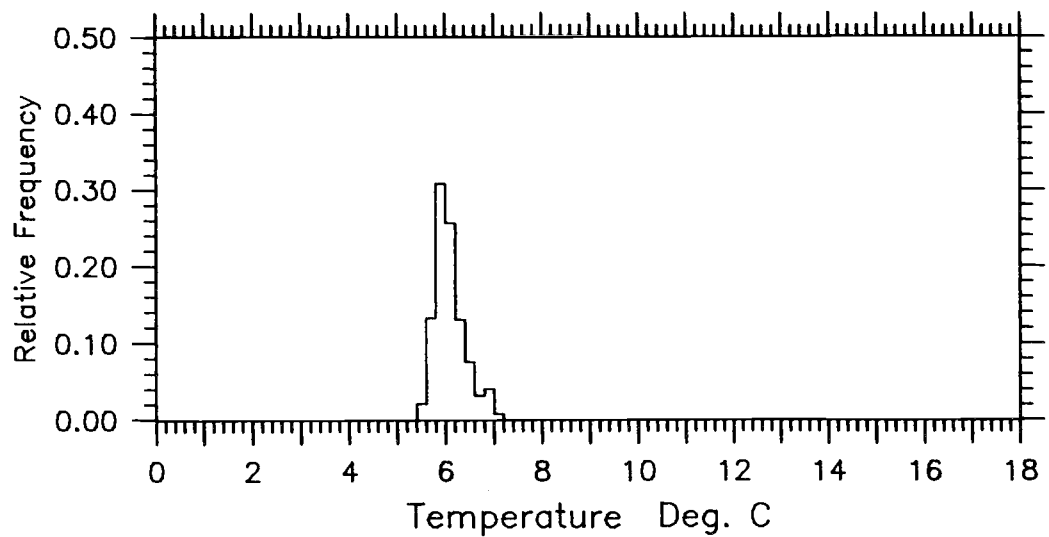
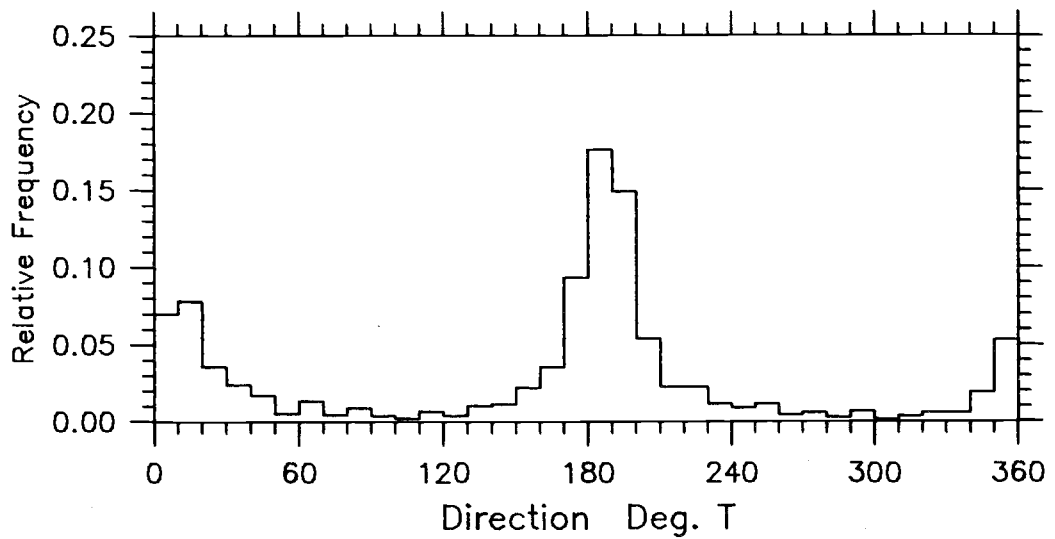
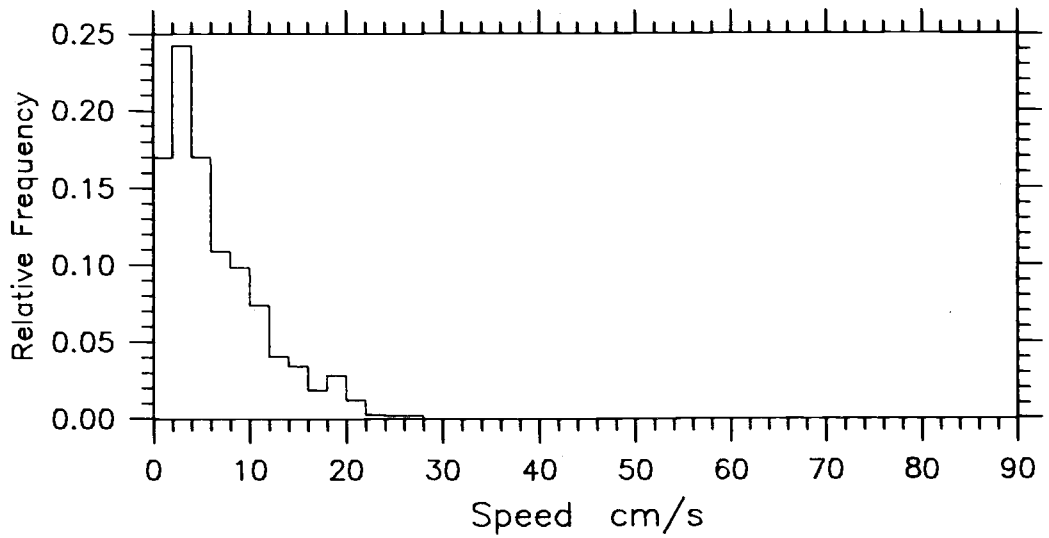
5 South Slope Period VI 160m



5 South Slope Period VI 283m



5 South Slope Period VI 434m

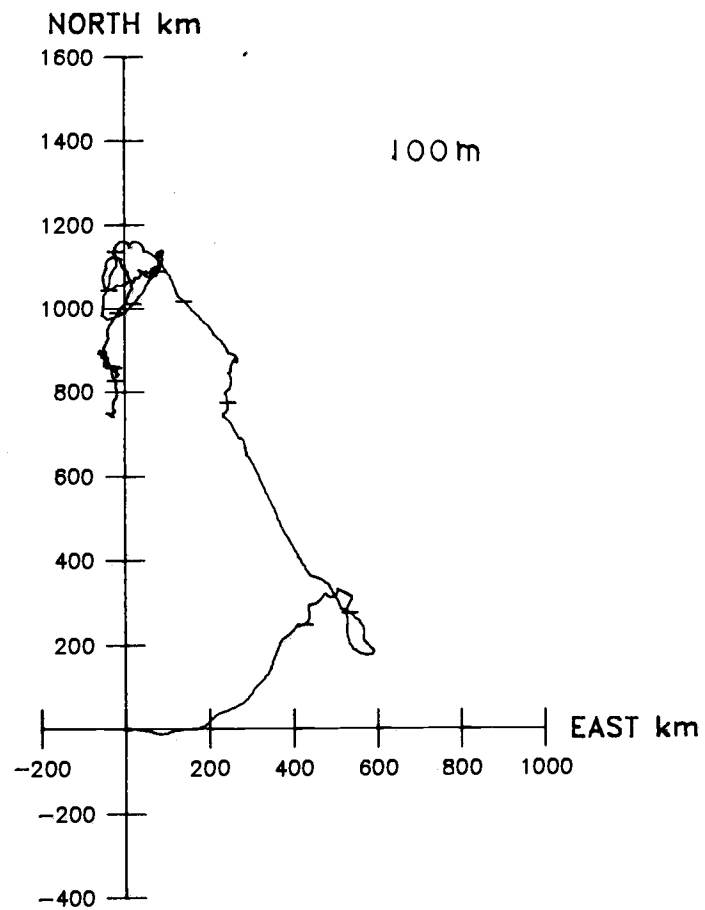
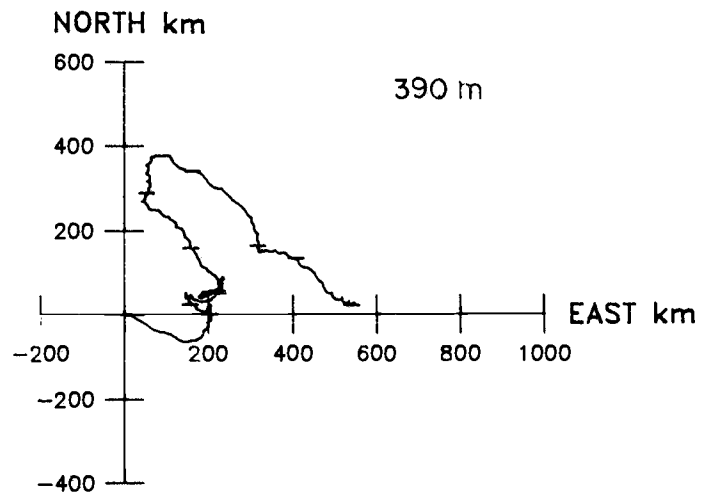
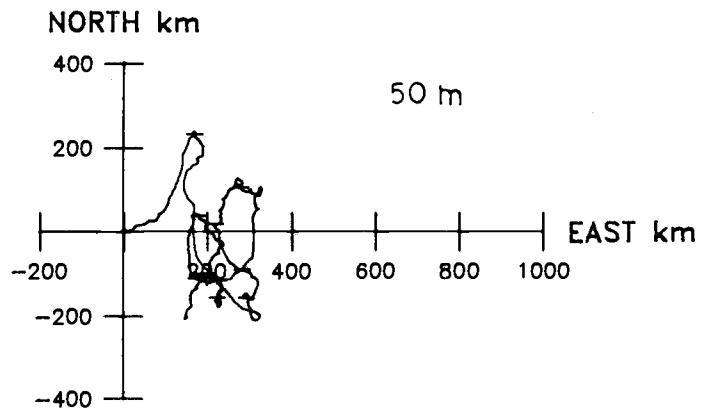


5 South Slope Period VI 730m

MOORING 5 SOUTH OFFSHORE

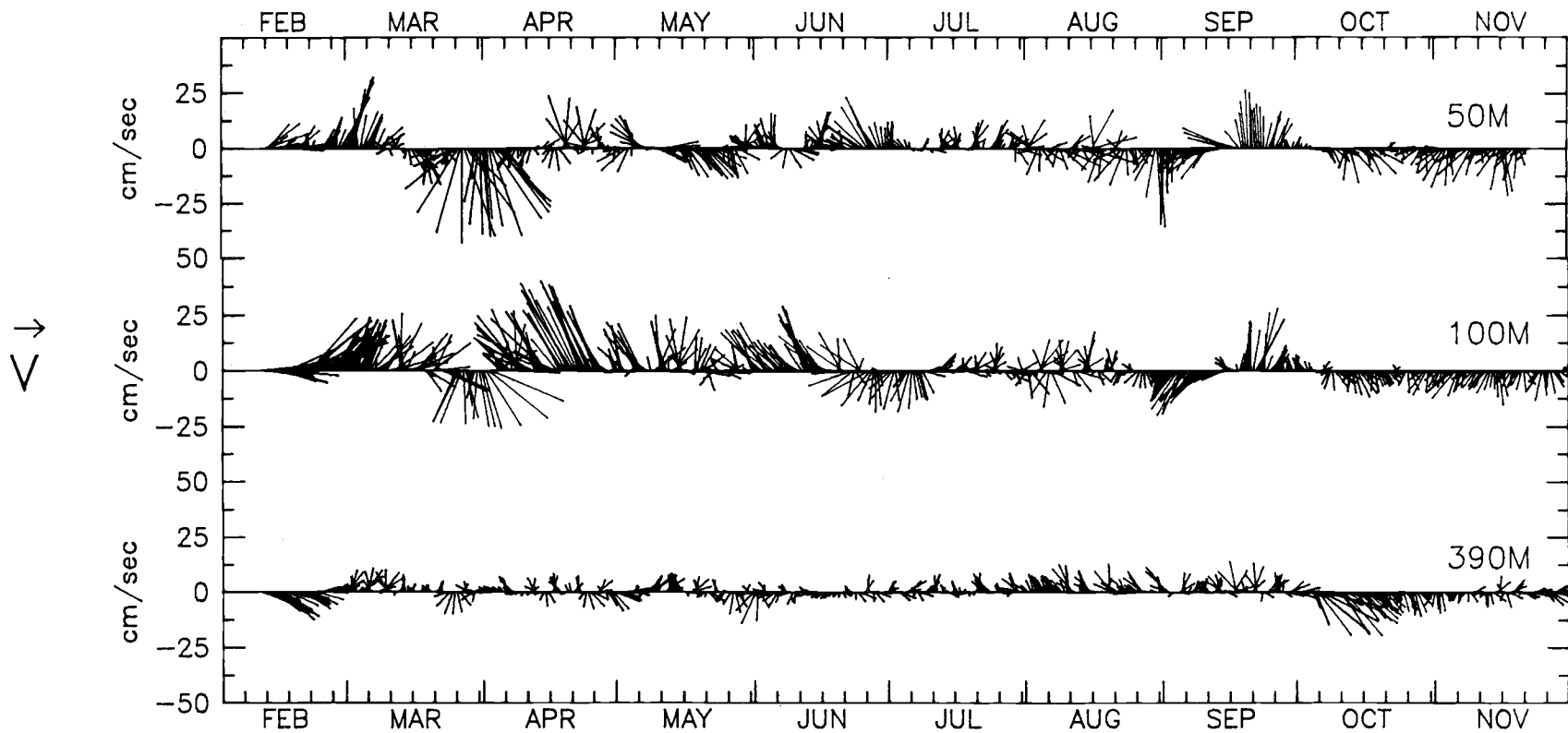
MOORING 5 South Offshore

PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
IV/V	50	1141	1547	0.6 (7.7)	-0.8 (11.1)	19.81 (3.94)	14.92	27.23	1.0	145.0	-2.9
	100	1540	1578	-0.1 (9.2)	2.3 (11.0)	15.95 (1.58)	14.05	20.39	2.3	356.6	-20.2
	390	1334	1334	1.9 (6.0)	0.1 (5.6)	9.56 (0.61)	7.83	11.32	1.9	87.8	-50.0



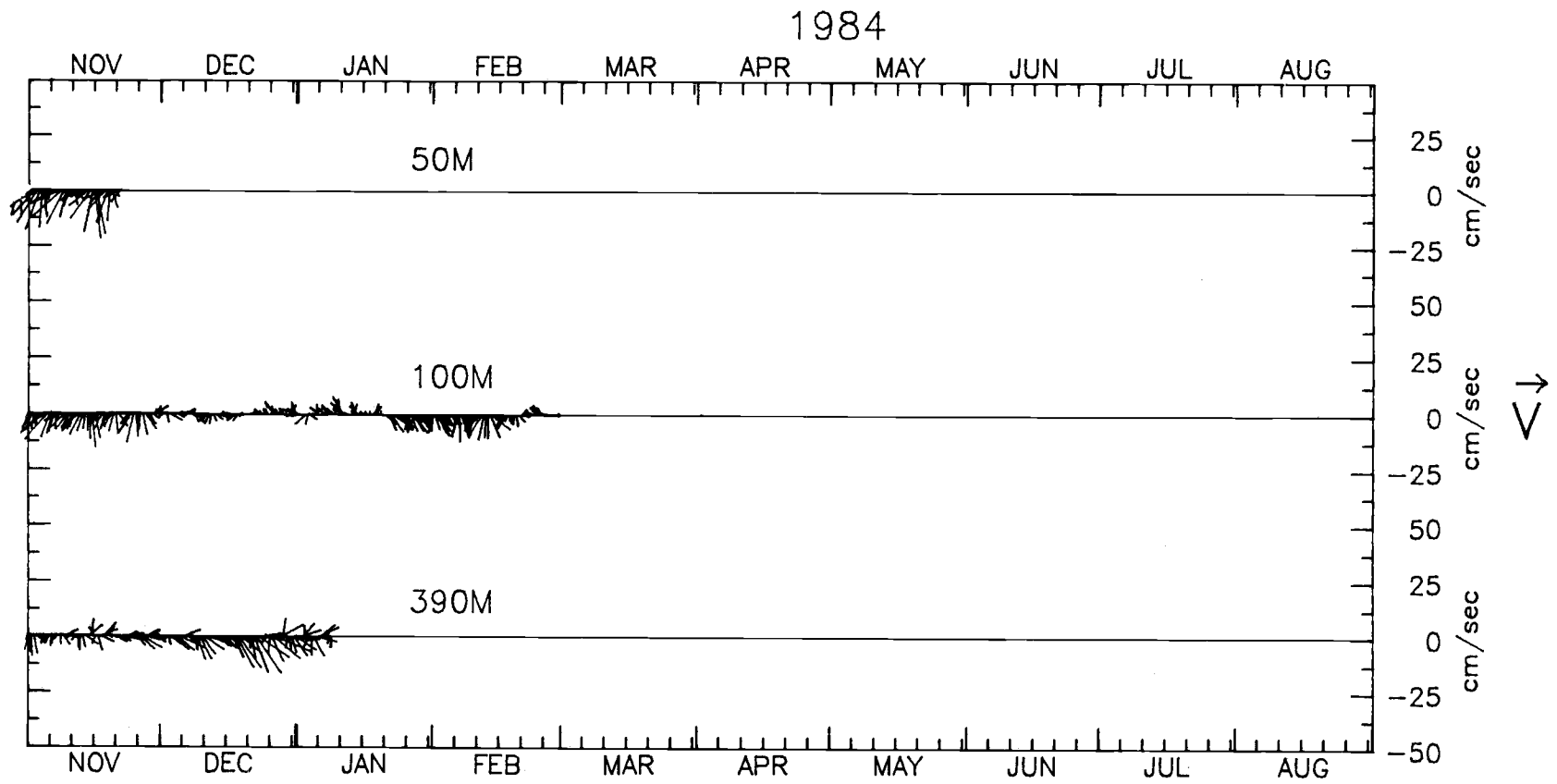
5 South Offshore Period IV/V

1983

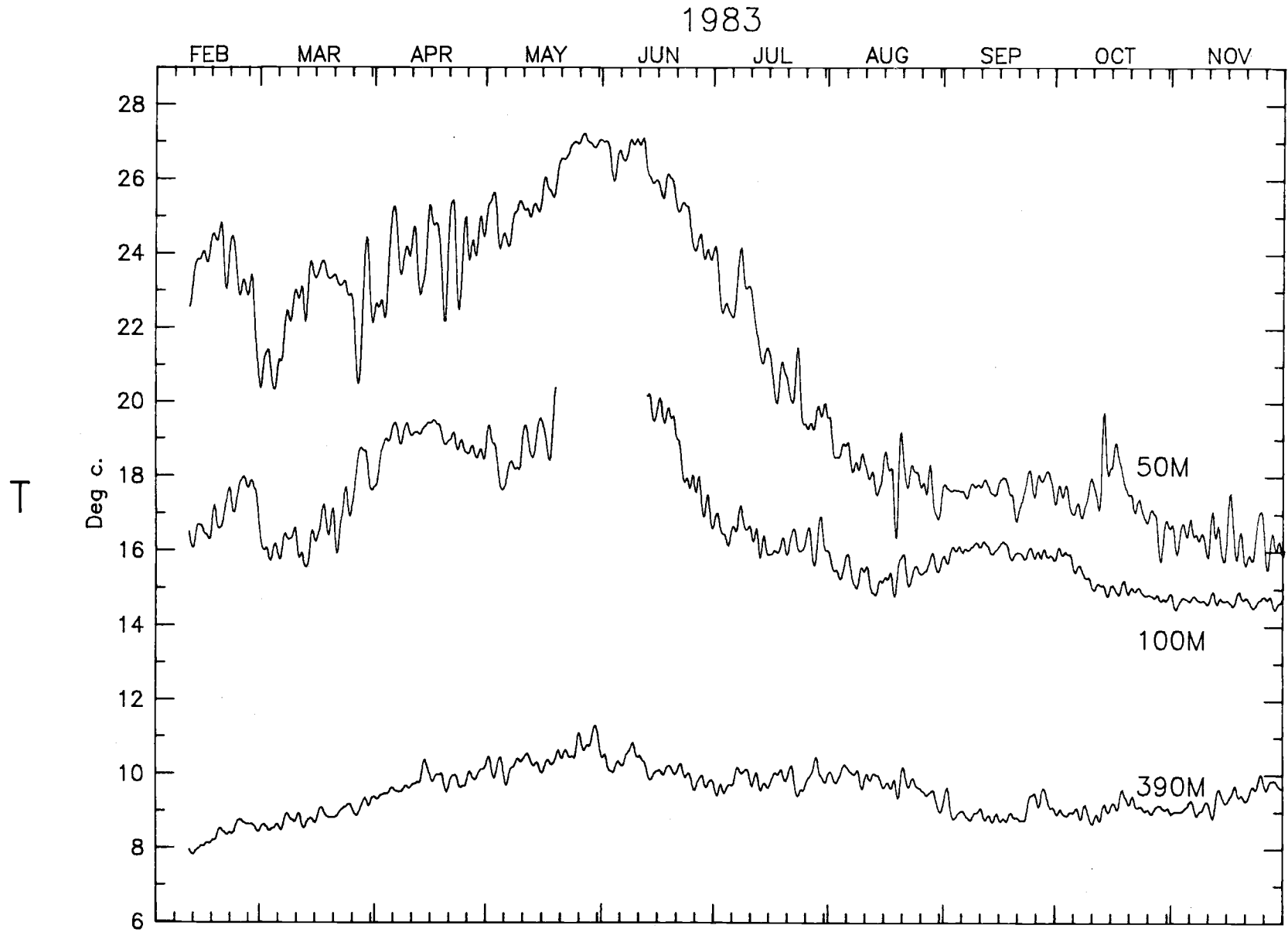


\vec{V} →

5 South Offshore Period IV

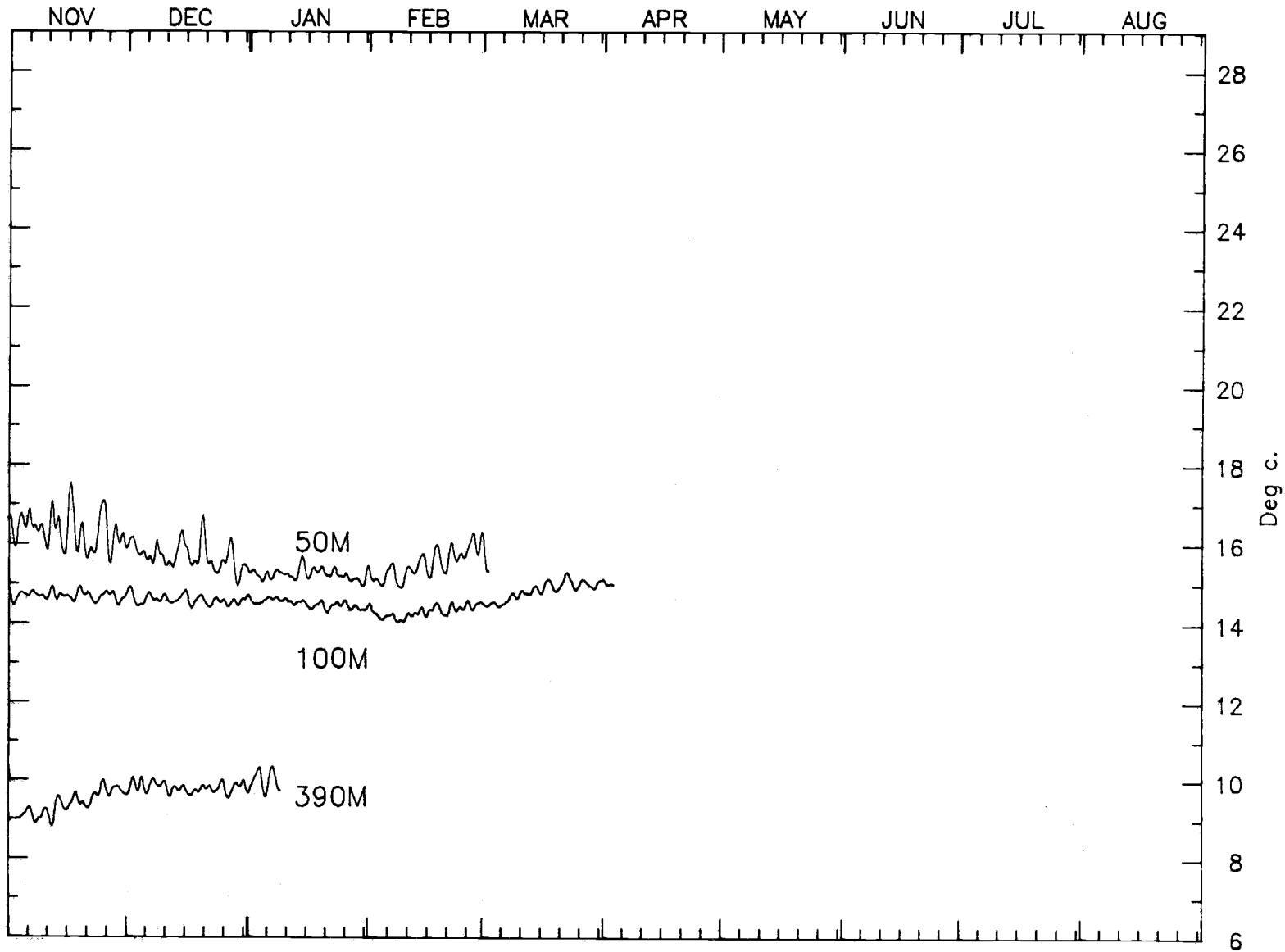


5 South Offshore Period IV/V

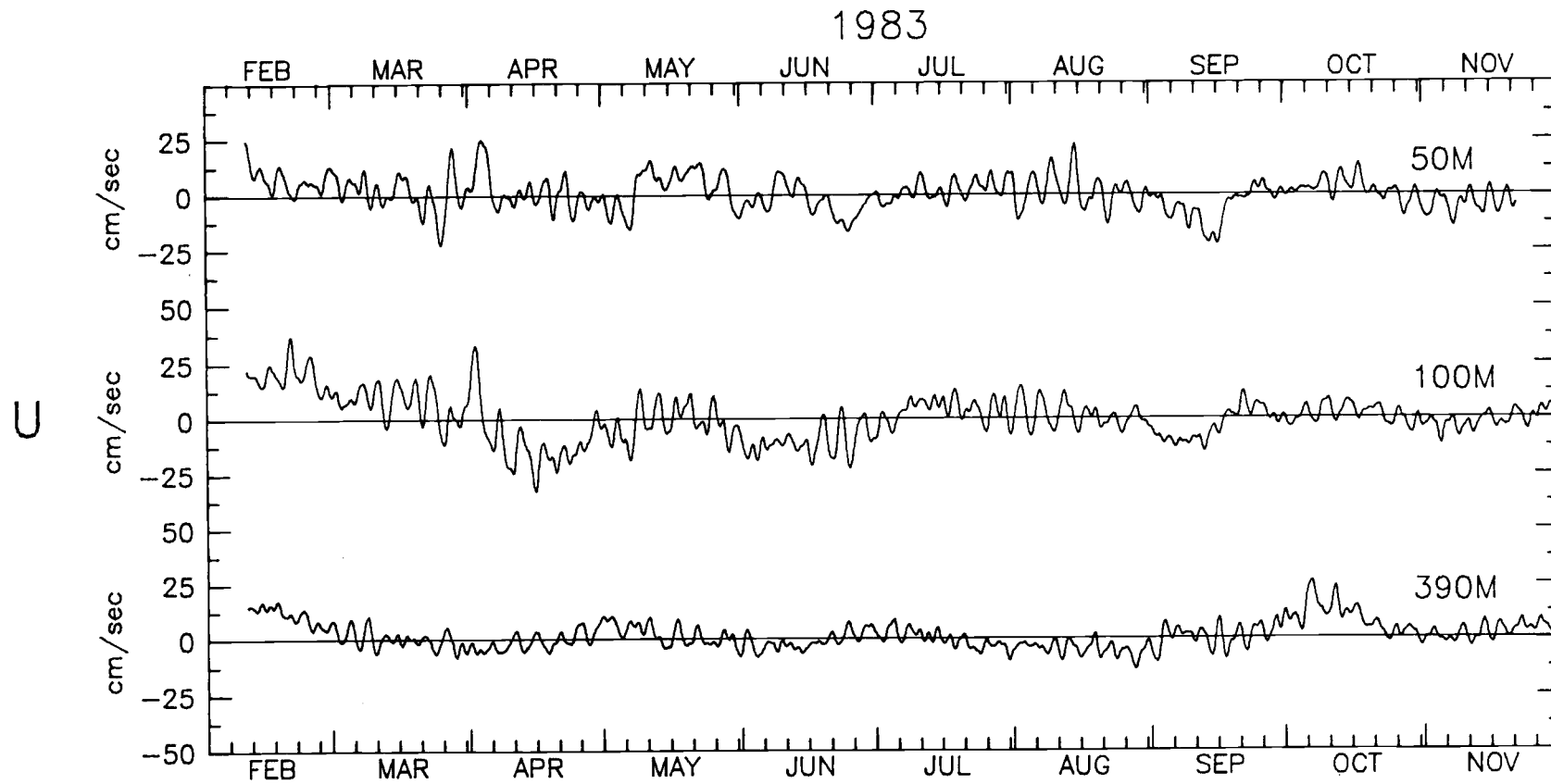


5 South Offshore Period IV

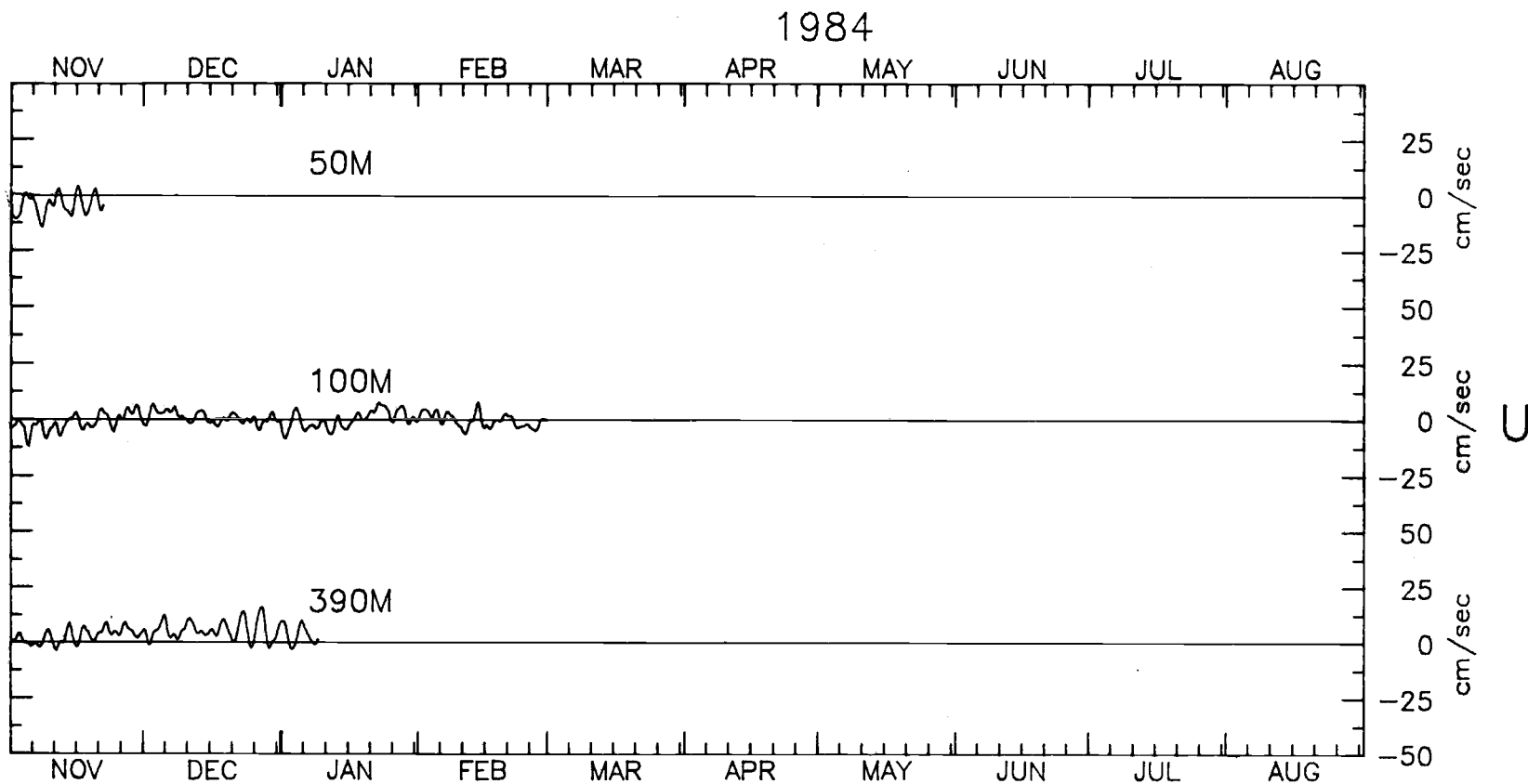
1984



5 South Offshore Period IV/V

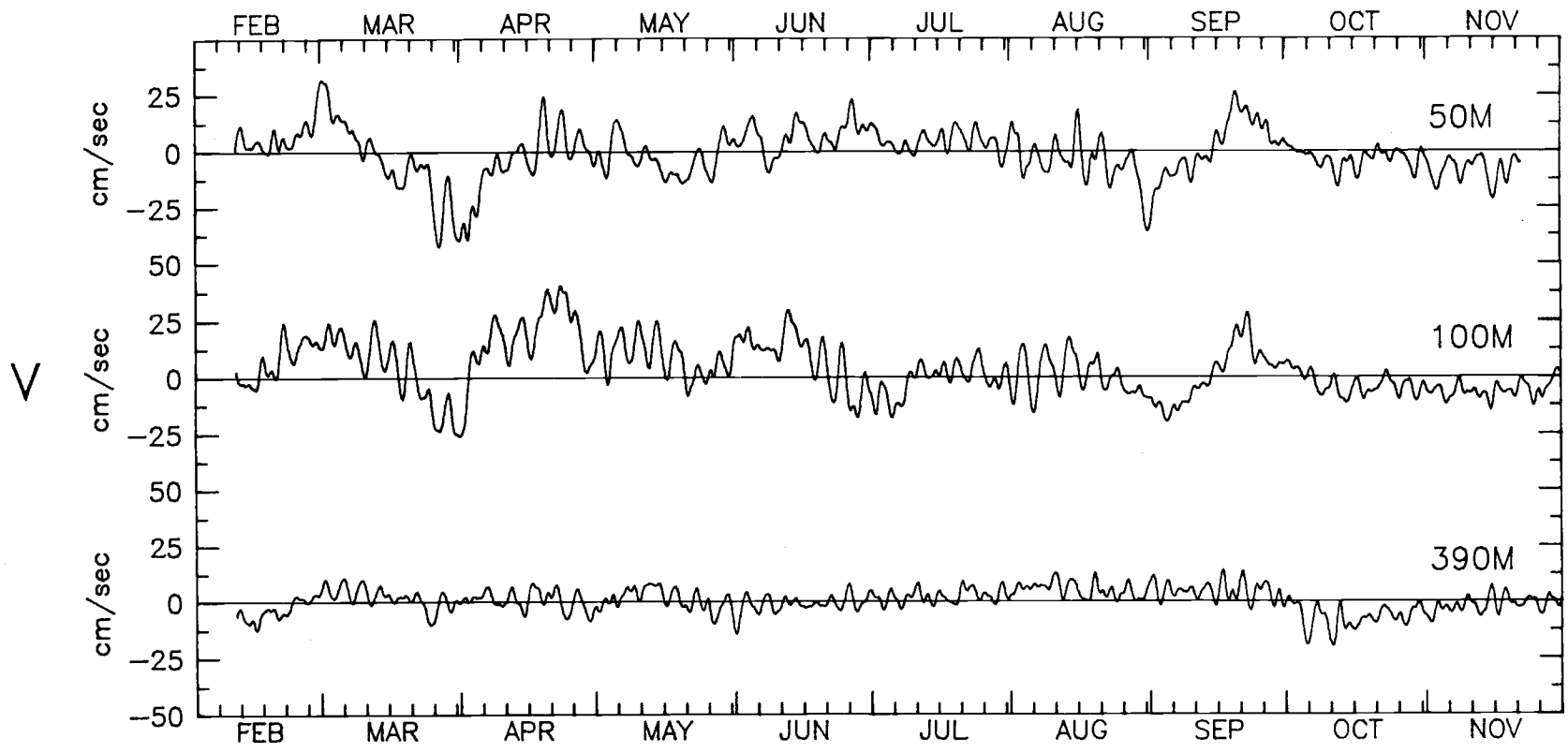


5 South Offshore Period IV



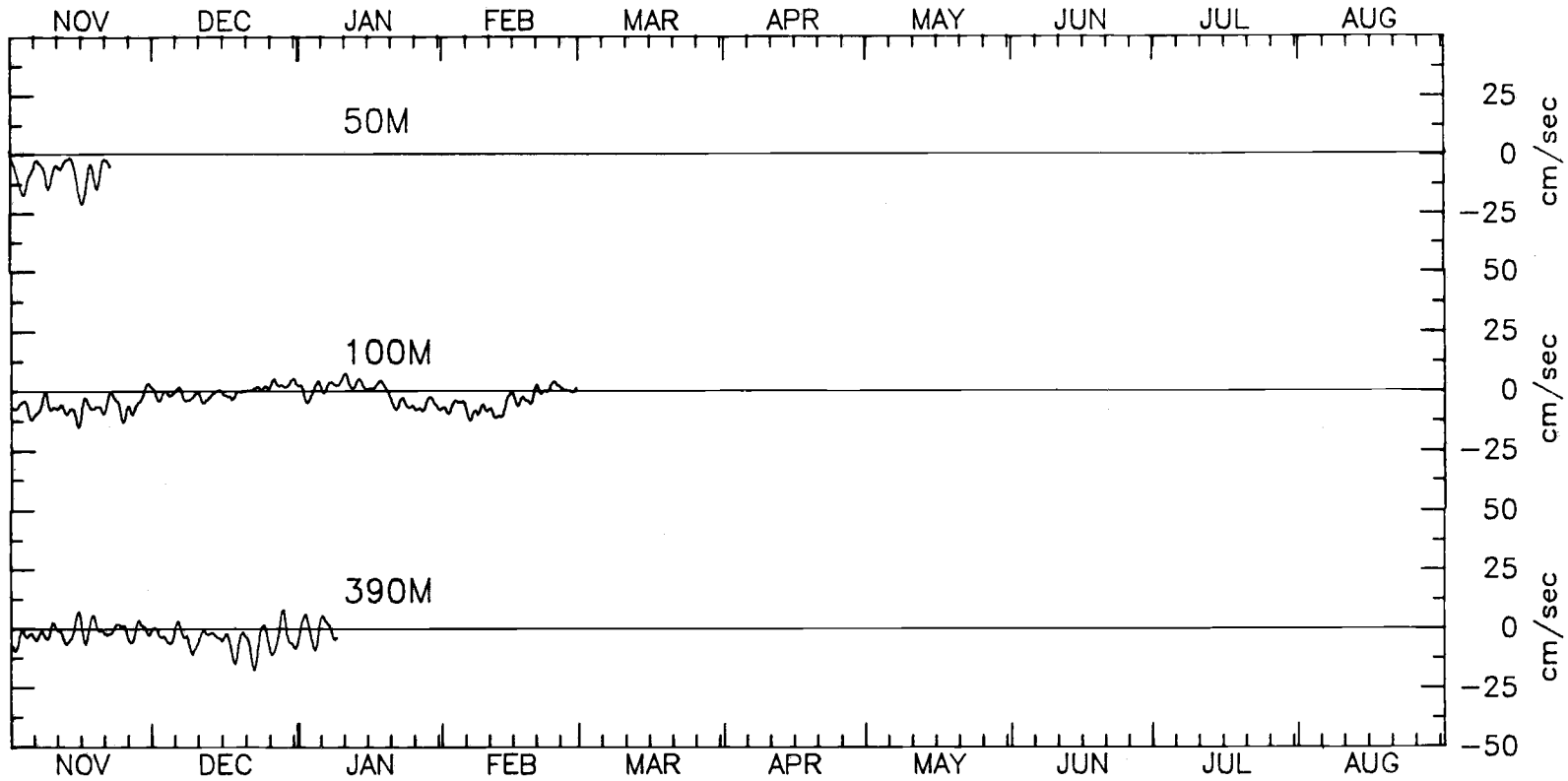
5 South Offshore Period IV/V

1983

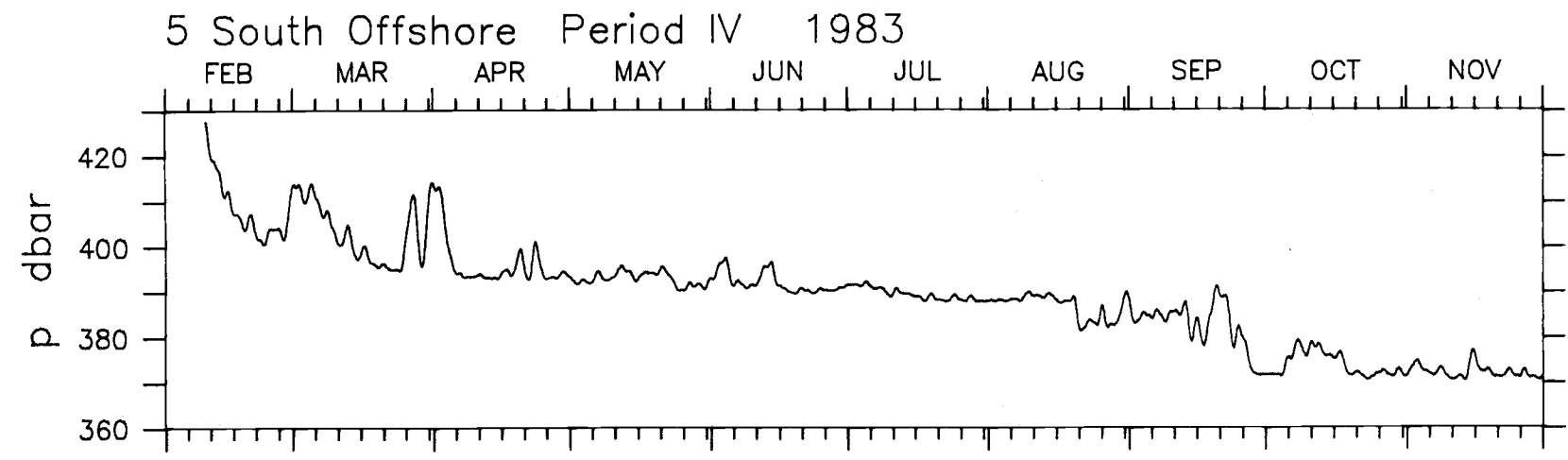
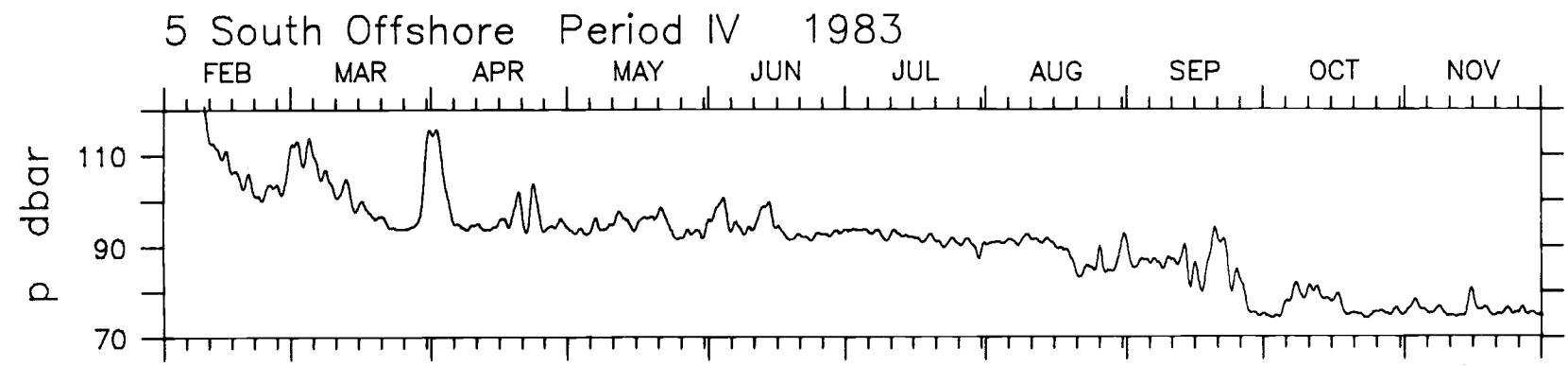
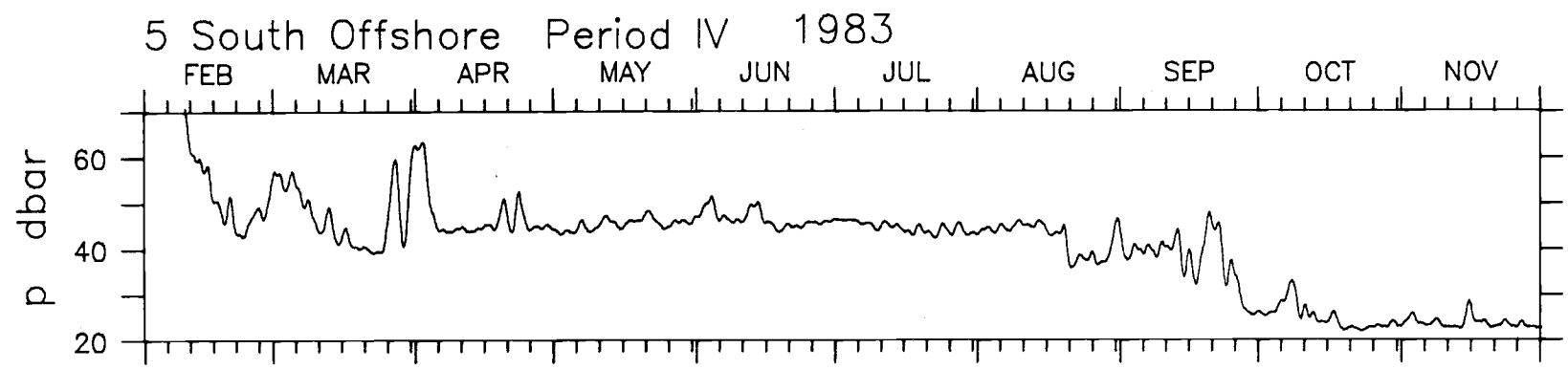


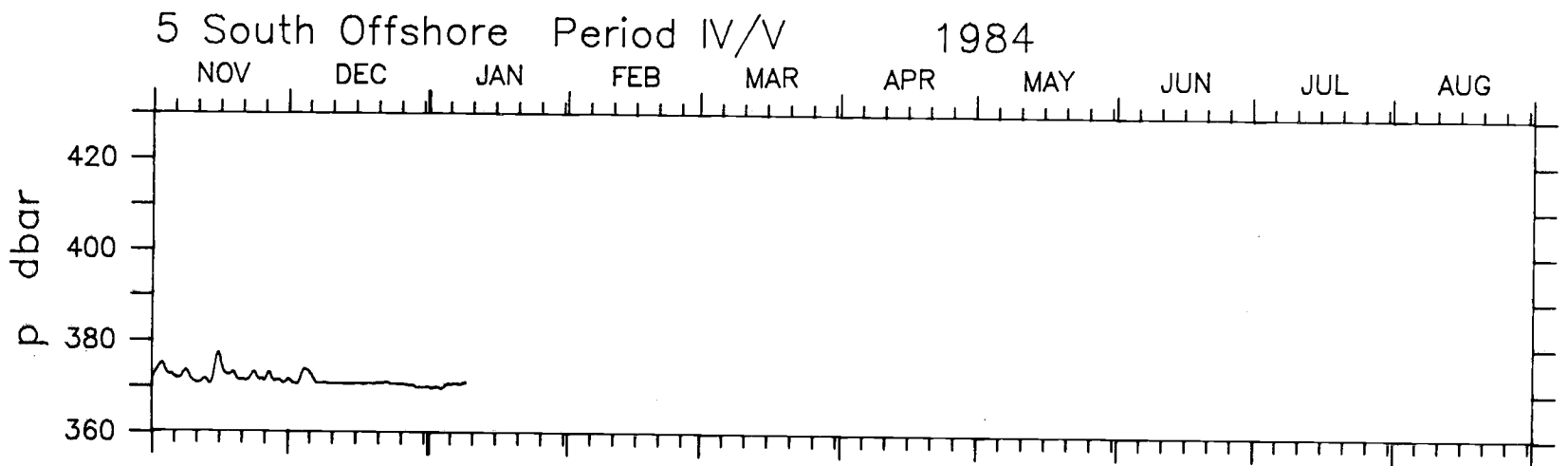
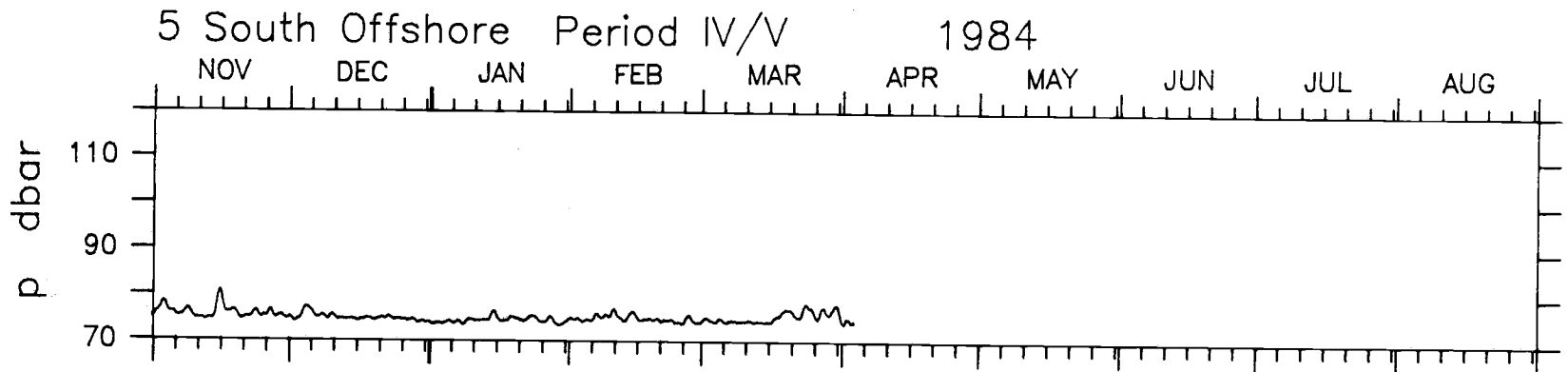
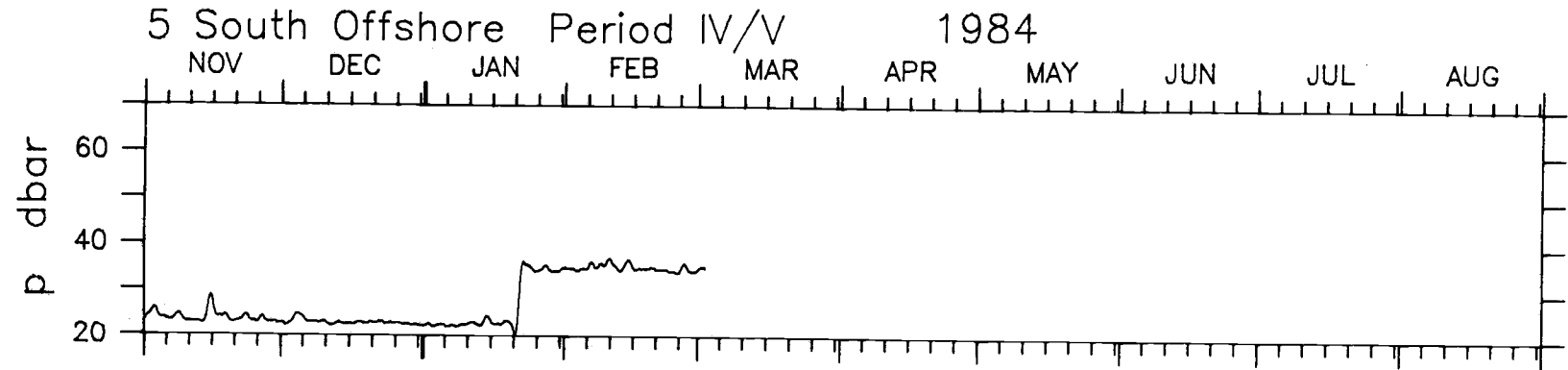
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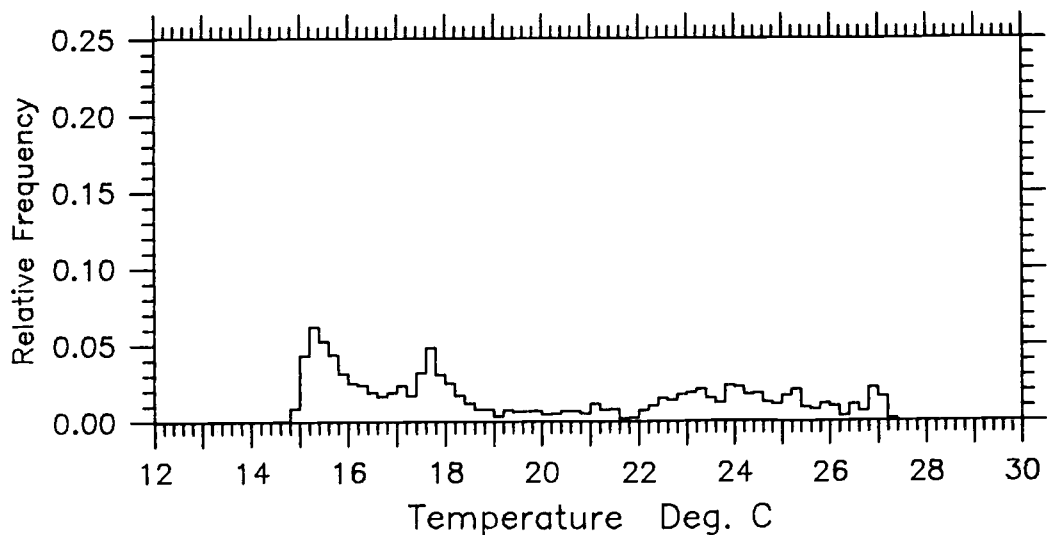
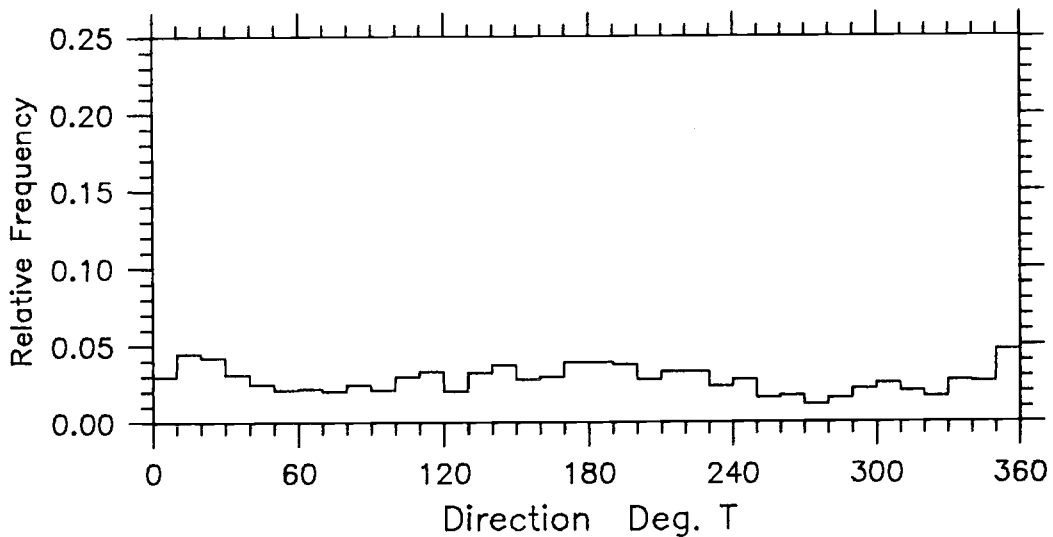
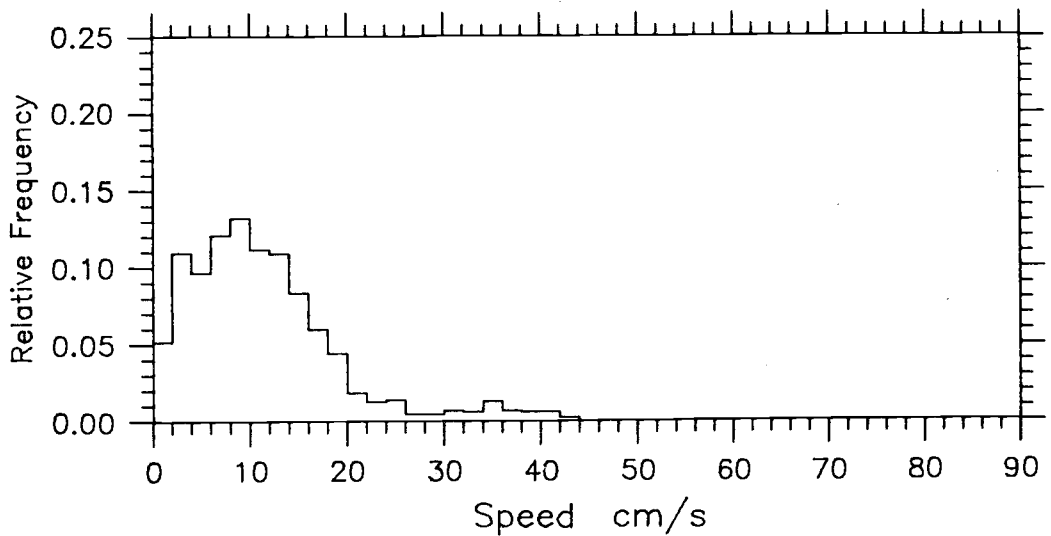
1984



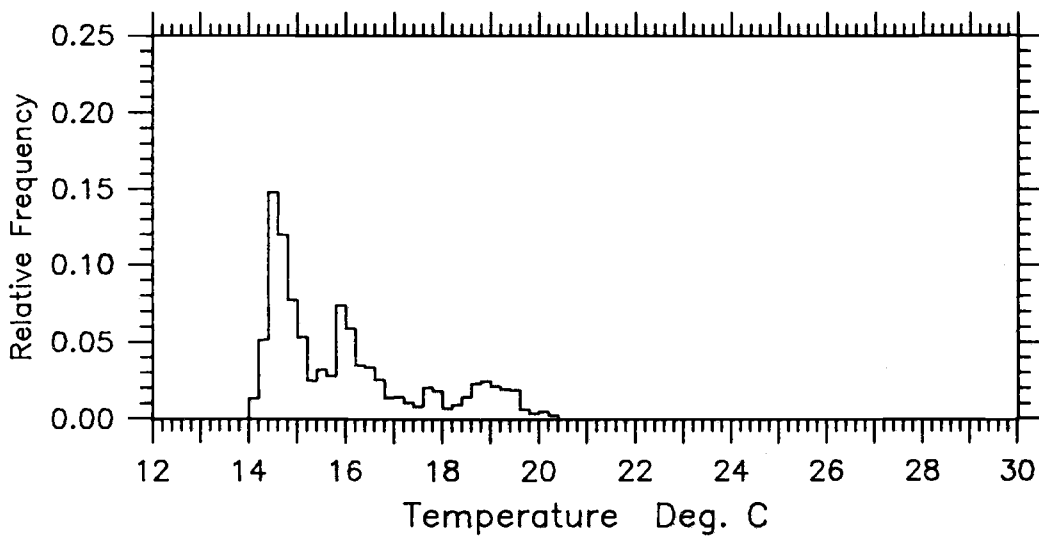
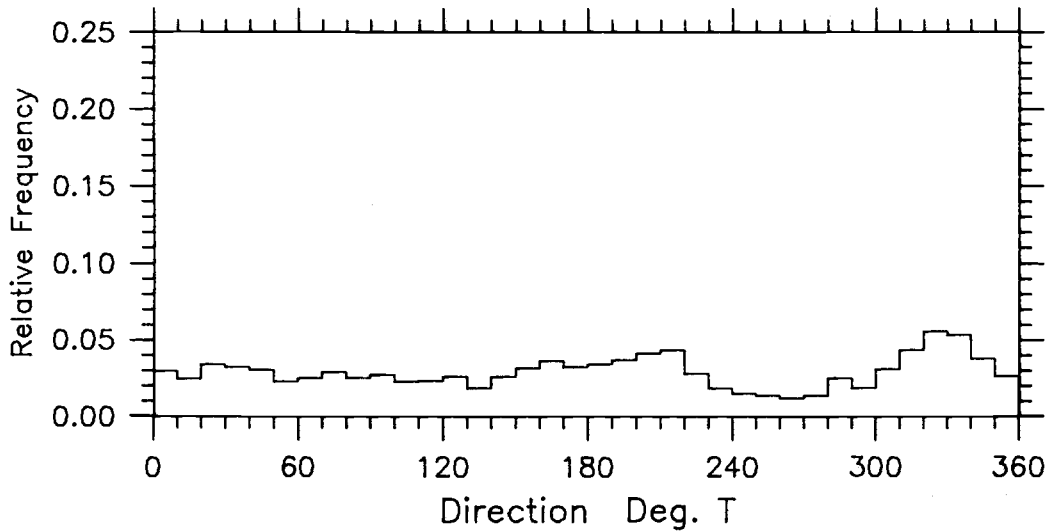
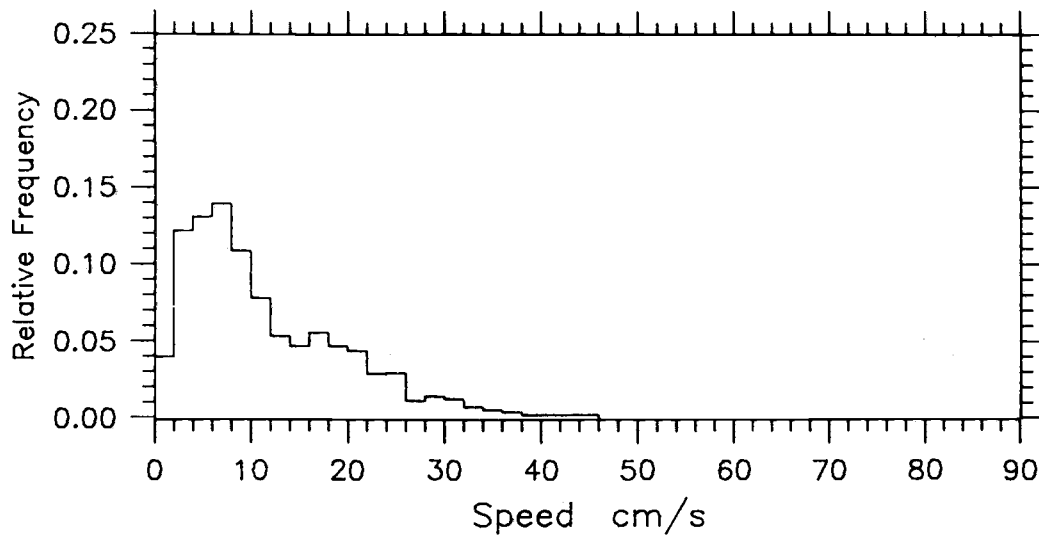
5 South Offshore Period IV/V



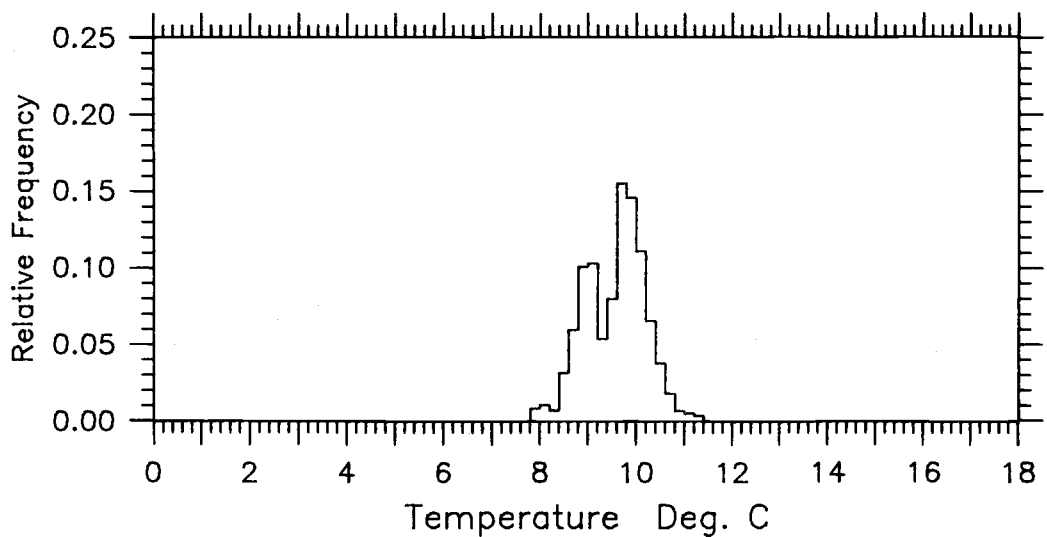
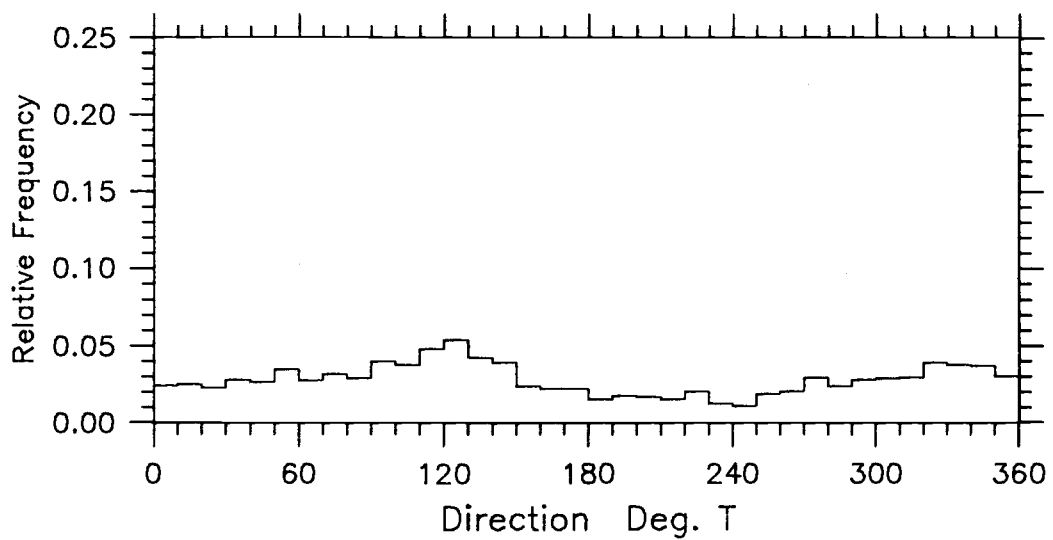
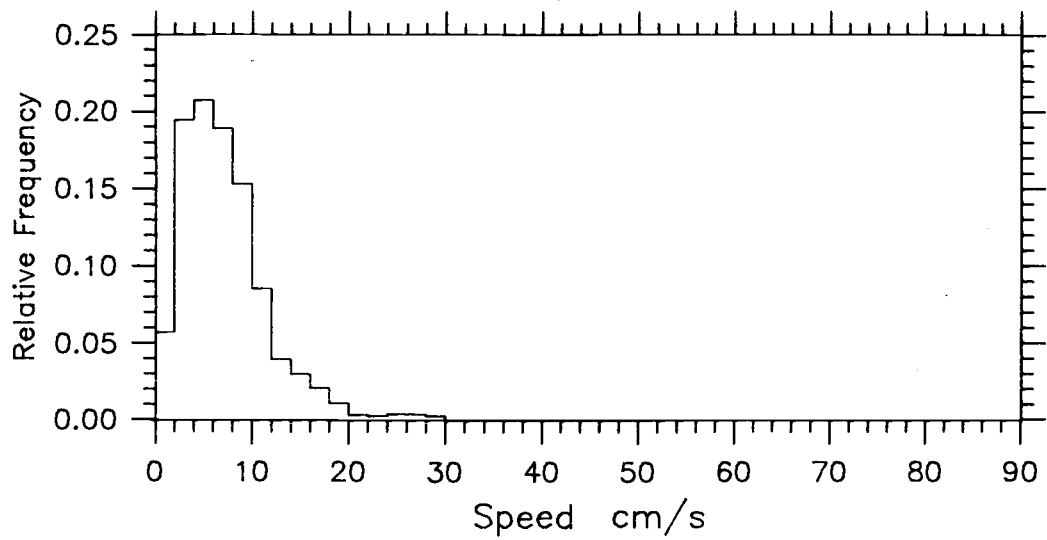




5 South Offshore Period IV 50m



5 South Offshore Period IV 100m

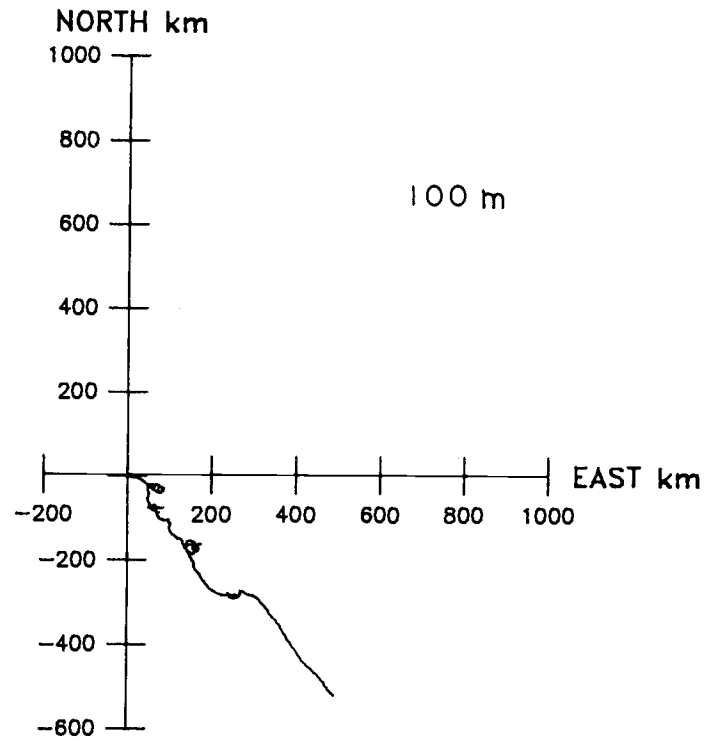
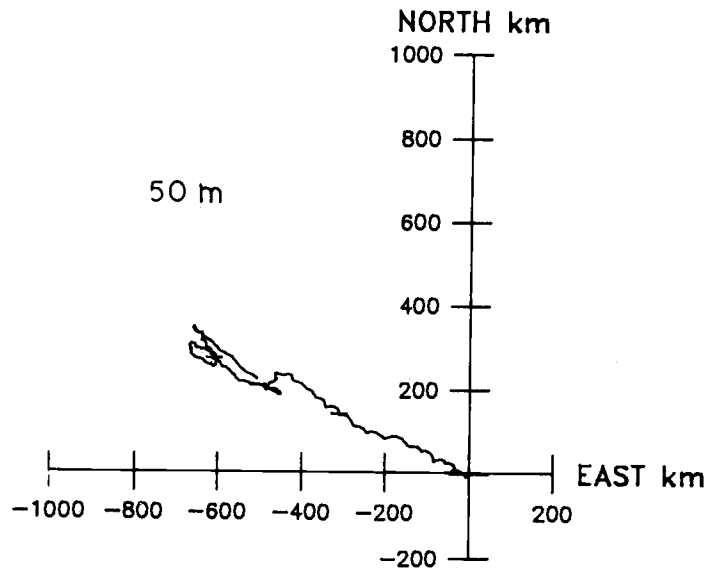


5 South Offshore Period IV 390m

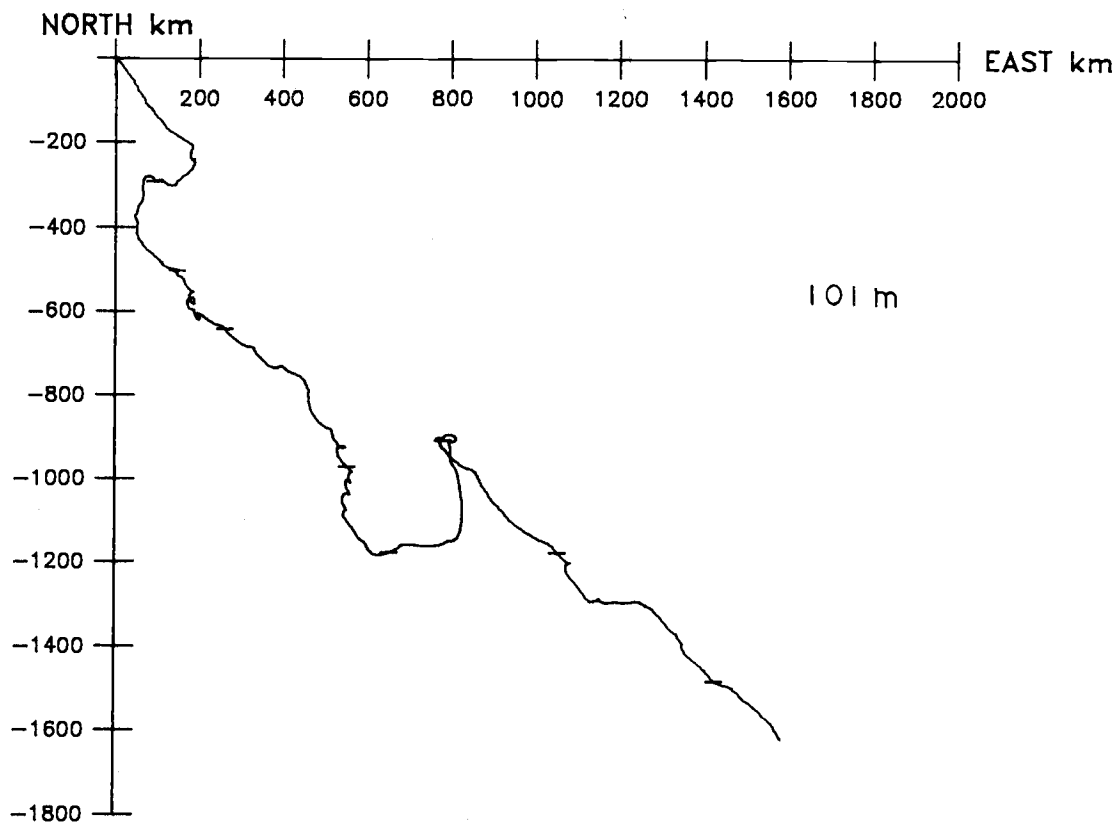
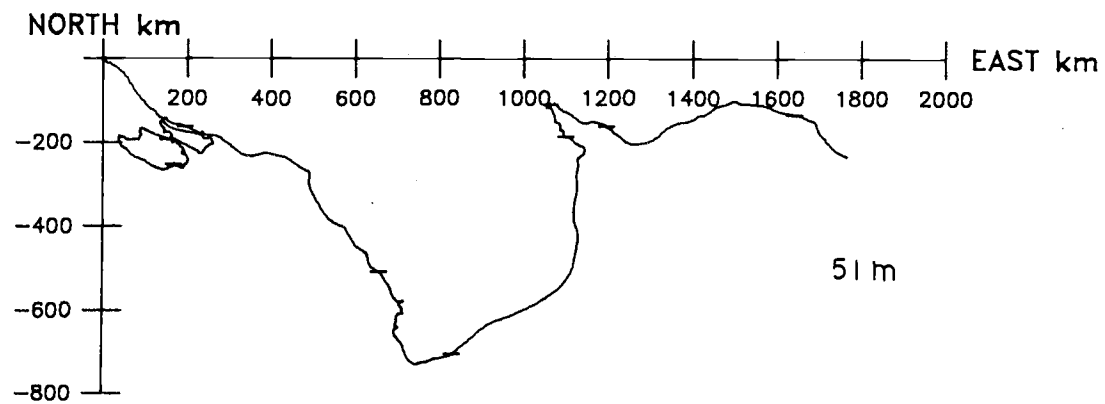
MOORING 10 SOUTH SHELF

MOORING 10 South Shelf

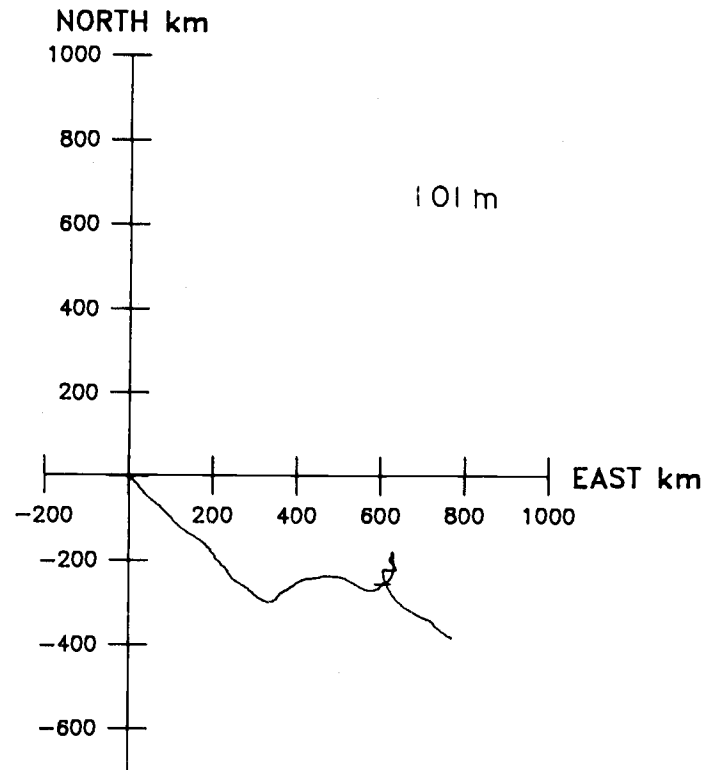
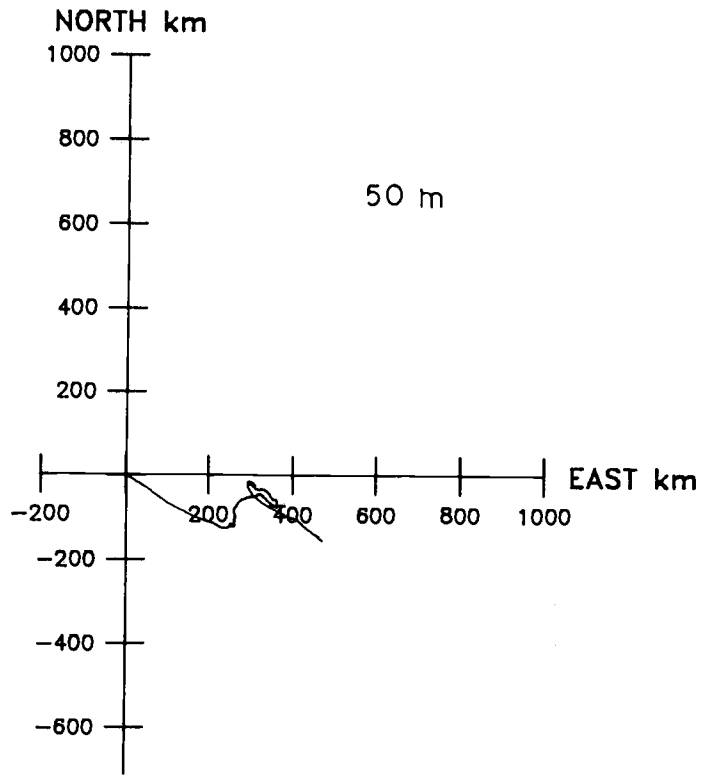
PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
I	50	454	454	-5.2 (11.7)	2.3 (9.9)	16.90 (0.83)	14.97	19.28	5.7	293.9	-53.5
	100	453	453	5.1 (8.1)	-5.3 (9.0)	14.20 (0.16)	13.78	14.54	7.3	136.4	-39.7
II	51	990	990	8.3 (13.2)	-1.1 (13.0)	18.58 (1.87)	15.89	23.81	8.3	97.6	-47.0
	101	990	990	7.4 (11.1)	-7.6 (11.6)	15.29 (0.95)	14.15	19.25	10.6	135.7	-41.5
III	50	219		10.0 (15.4)	-3.3 (12.3)				10.5	108.3	-53.4
	101	212	179	16.8 (13.8)	-8.4 (16.8)	20.38 (0.62)	18.24	20.94	18.8	116.5	-34.3
IV	58	841	1119	1.6 (12.5)	7.6 (11.0)	21.92 (2.91)	15.85	26.76	7.8	11.9	-51.3
	109	1119	1119	4.2 (9.8)	-1.3 (8.3)	16.84 (2.49)	13.08	22.32	4.4	107.6	-54.8
VI	50	1248	1248	0.1 (9.2)	0.6 (6.4)	15.19 (1.05)	14.05	19.33	0.6	9.8	-71.3
	100	1248	972	2.8 (8.7)	-3.8 (6.5)	13.91 (0.46)	13.23	15.29	4.7	143.6	-65.9



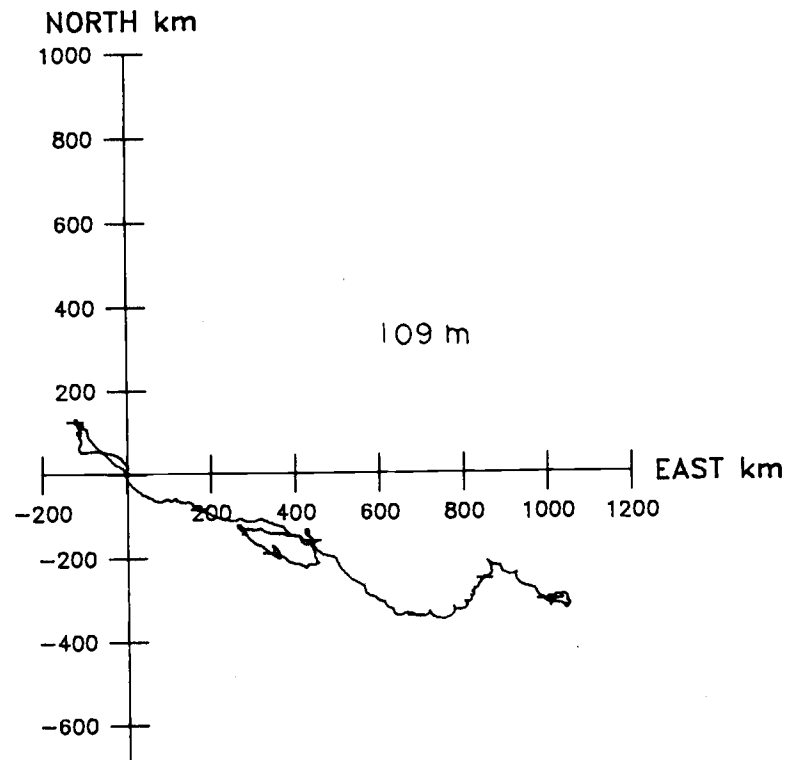
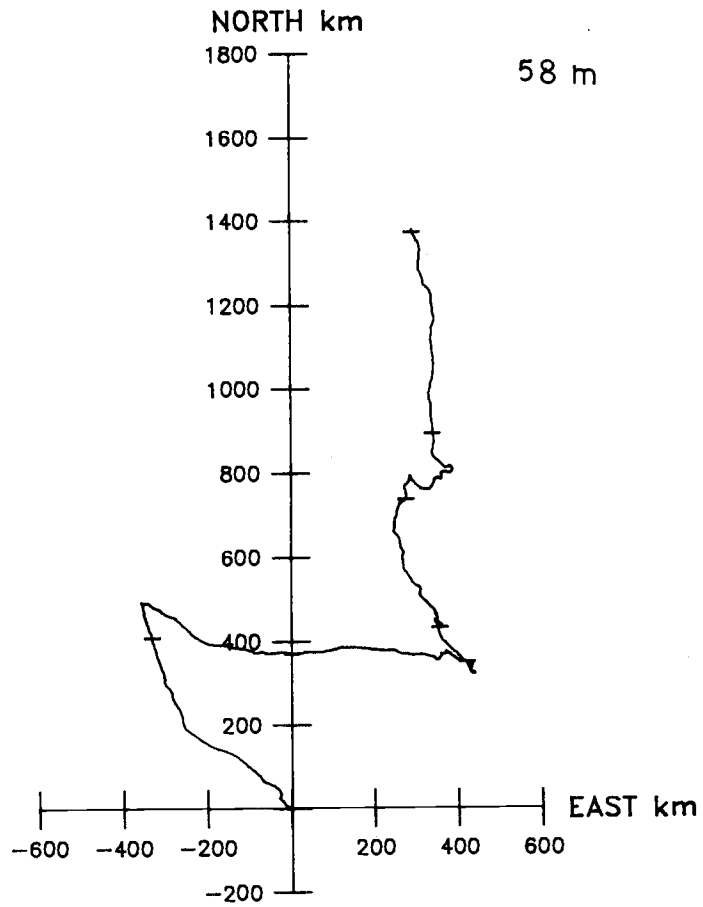
10 South Shelf Period I



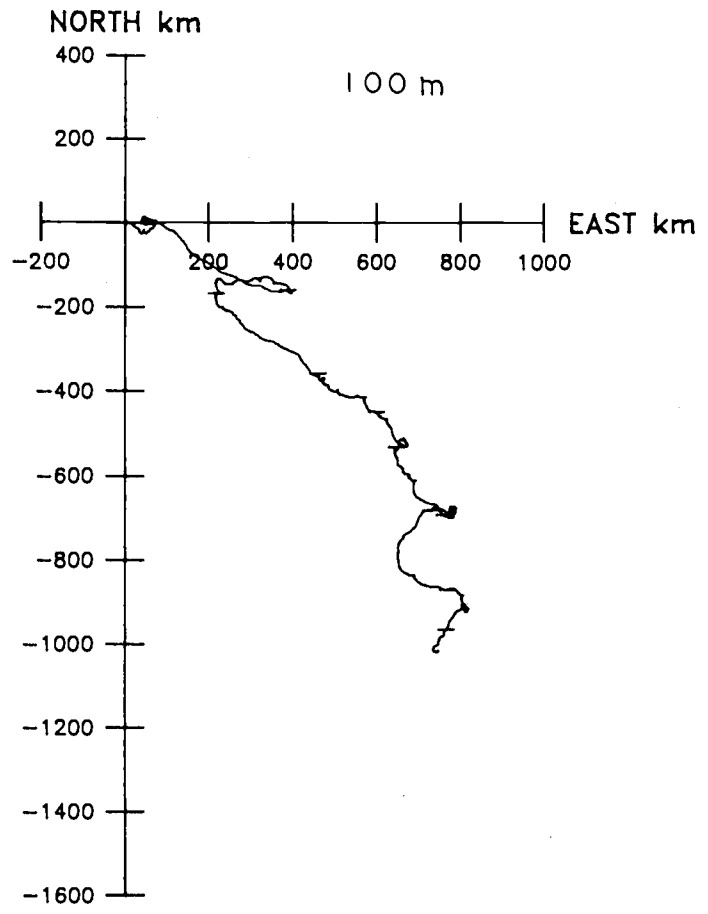
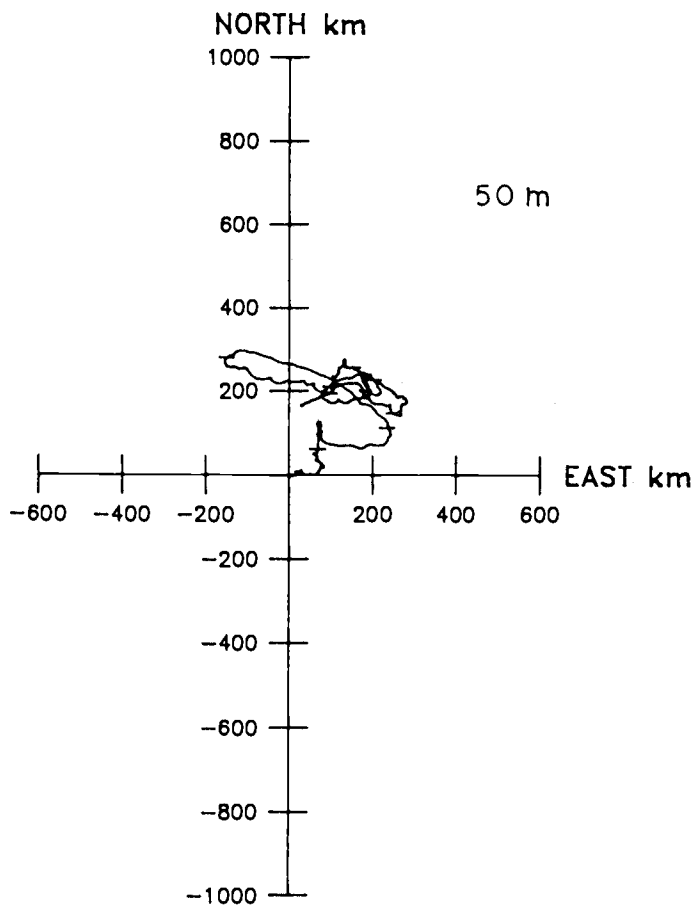
10 South Shelf Period II



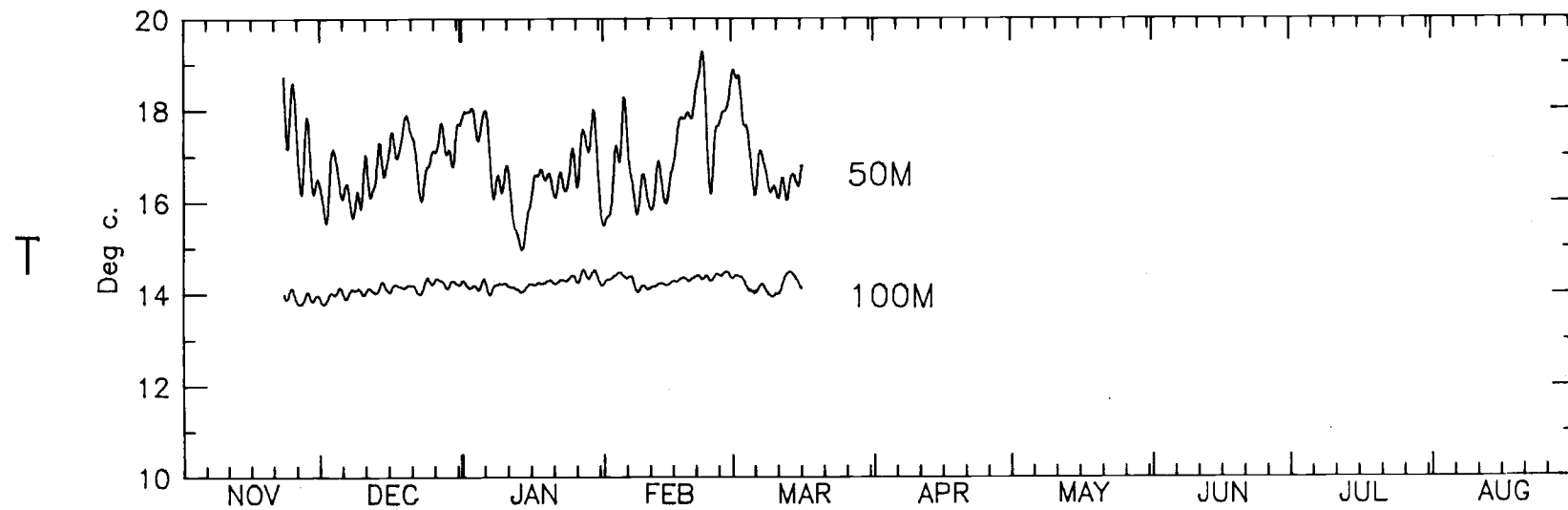
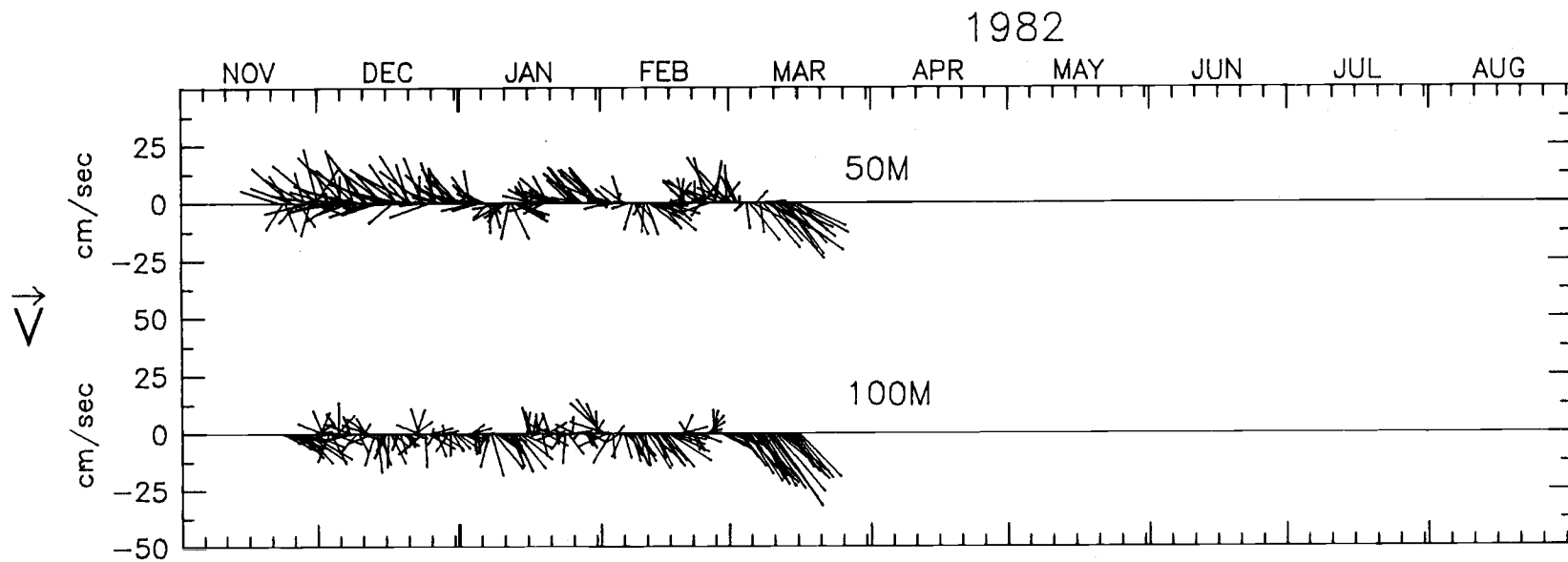
10 South Shelf Period III



10 South Shelf Period IV



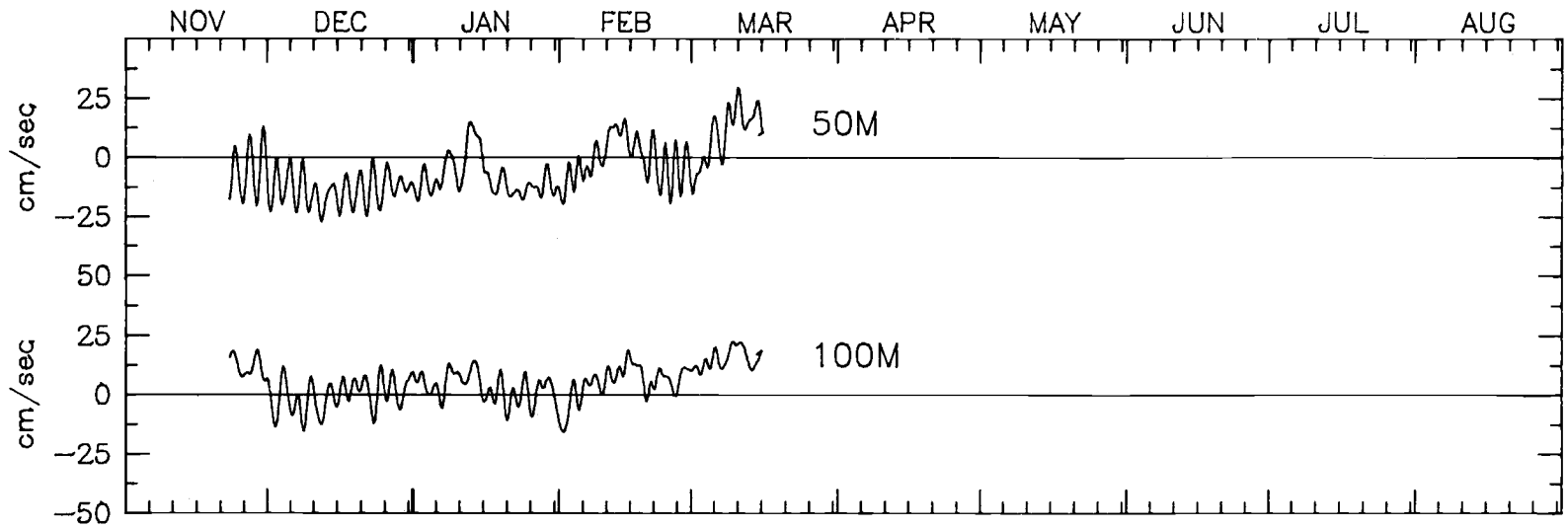
10 South Shelf Period VI



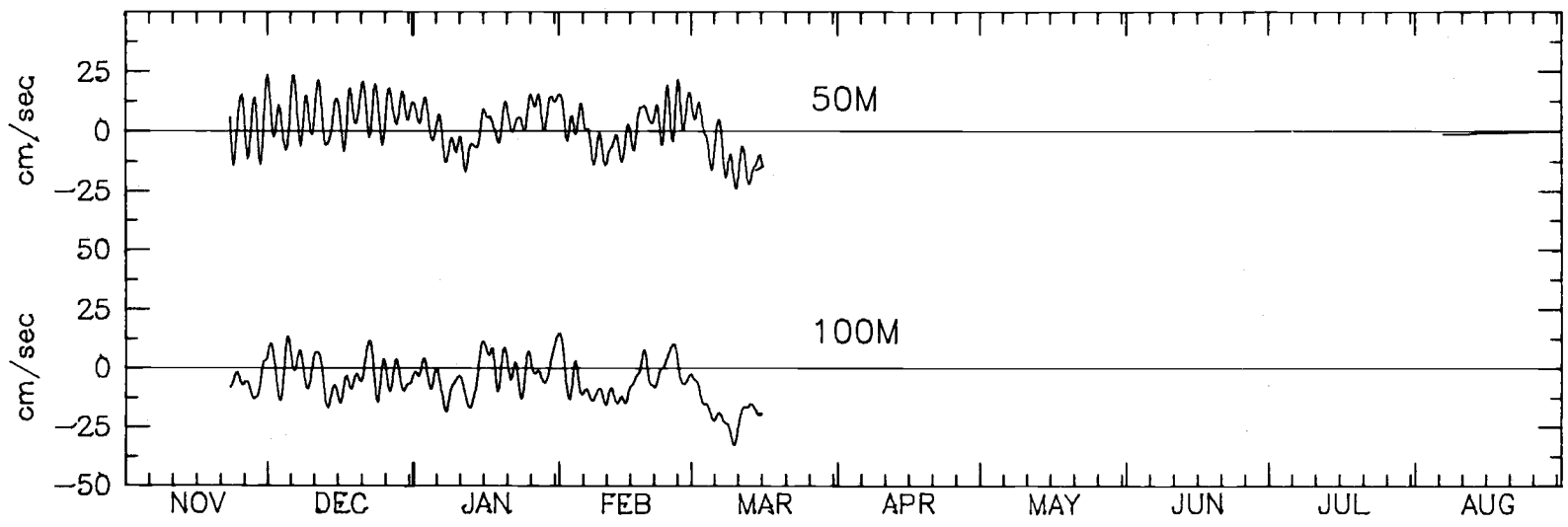
10 South Shelf Period I

1982

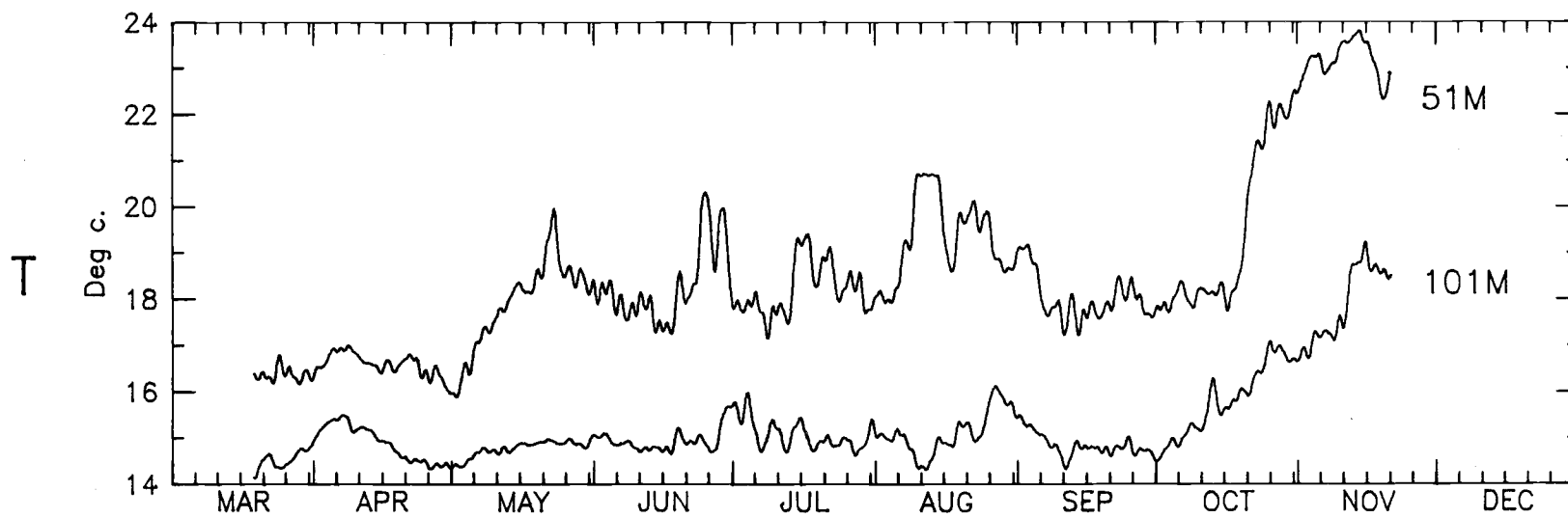
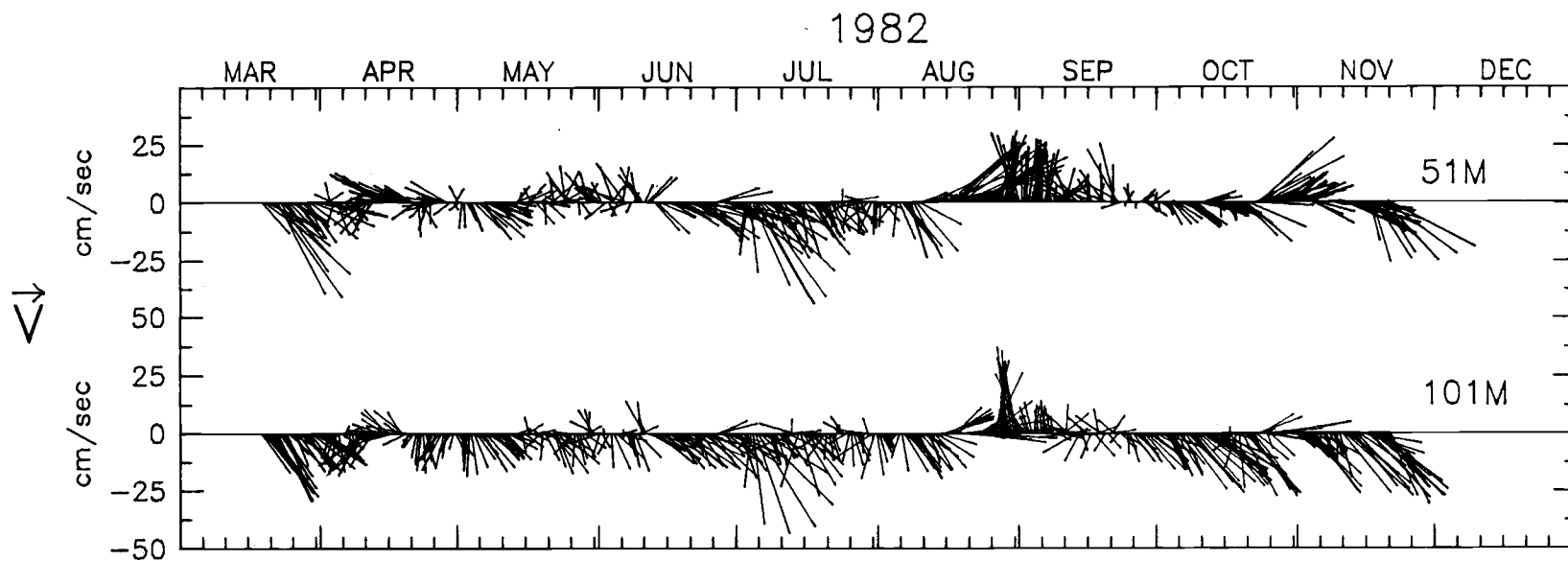
U



V



10 South Shelf Period I

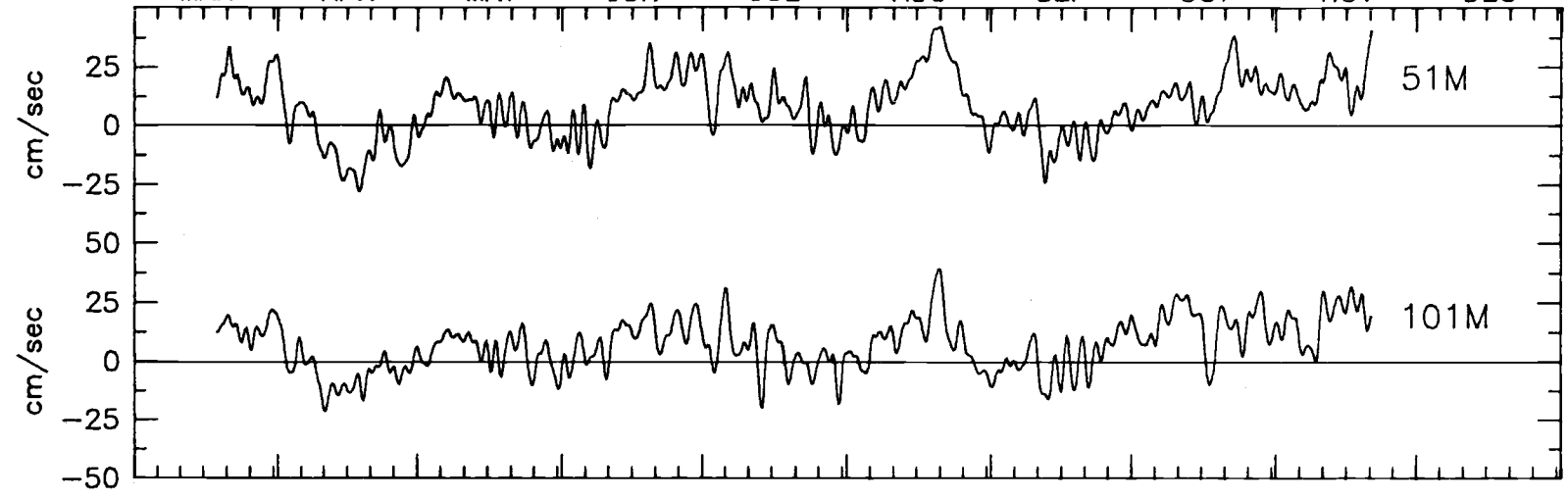


10 South Shelf Period II

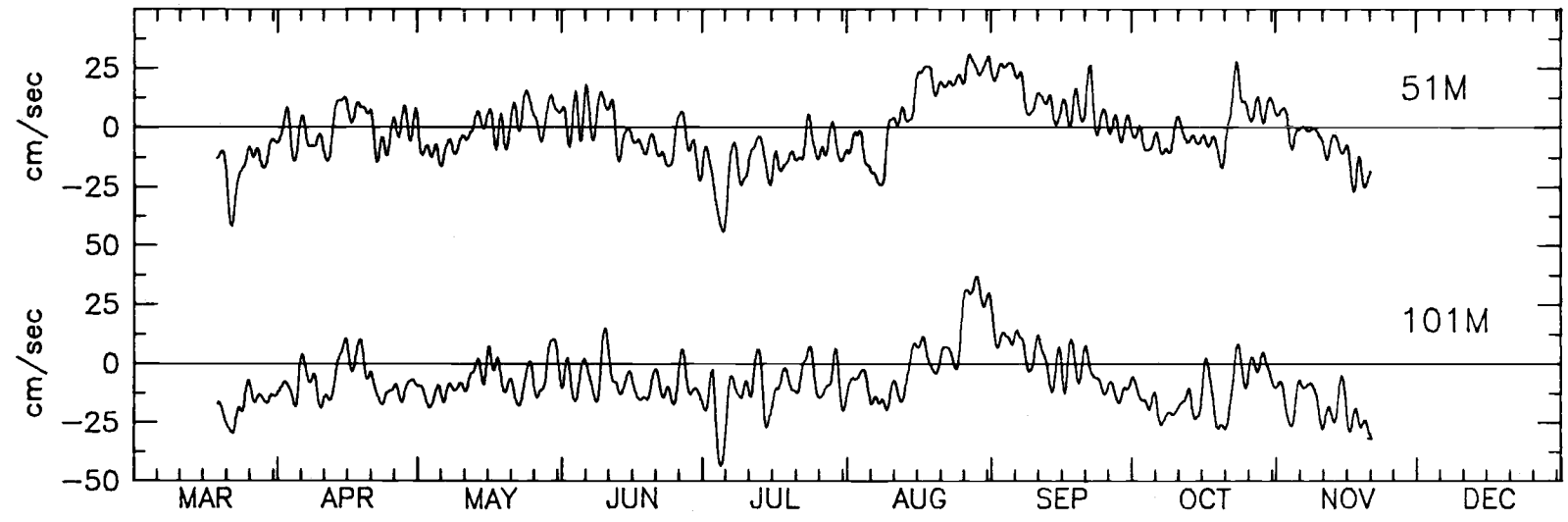
1982

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U

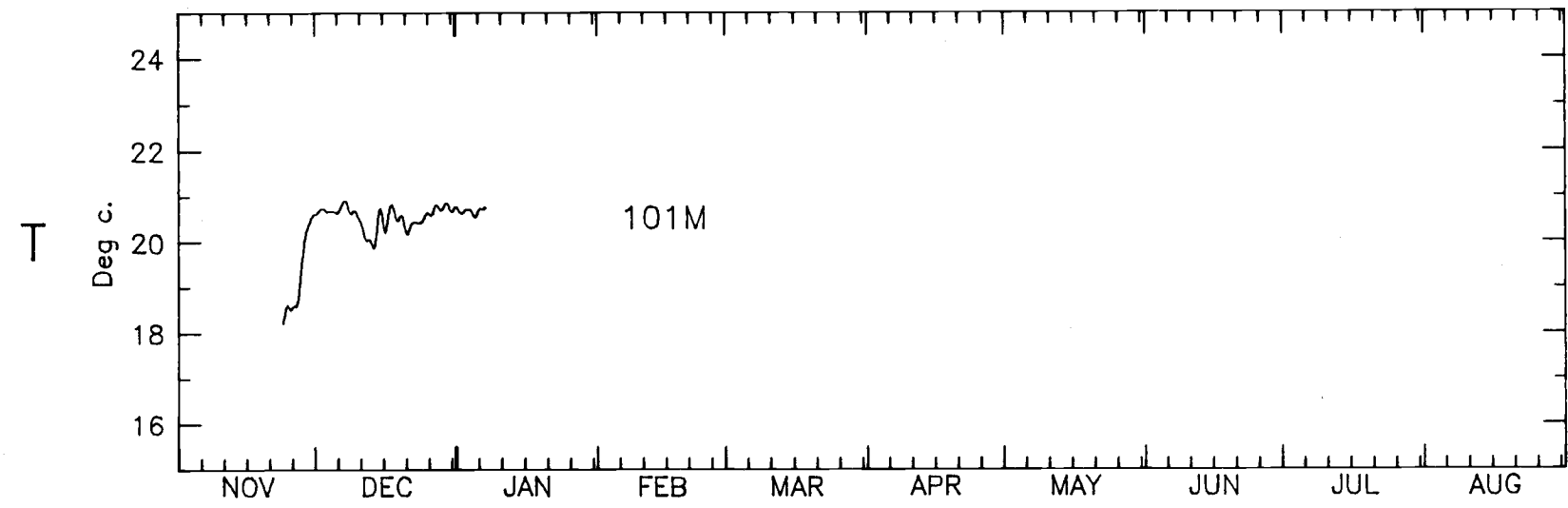
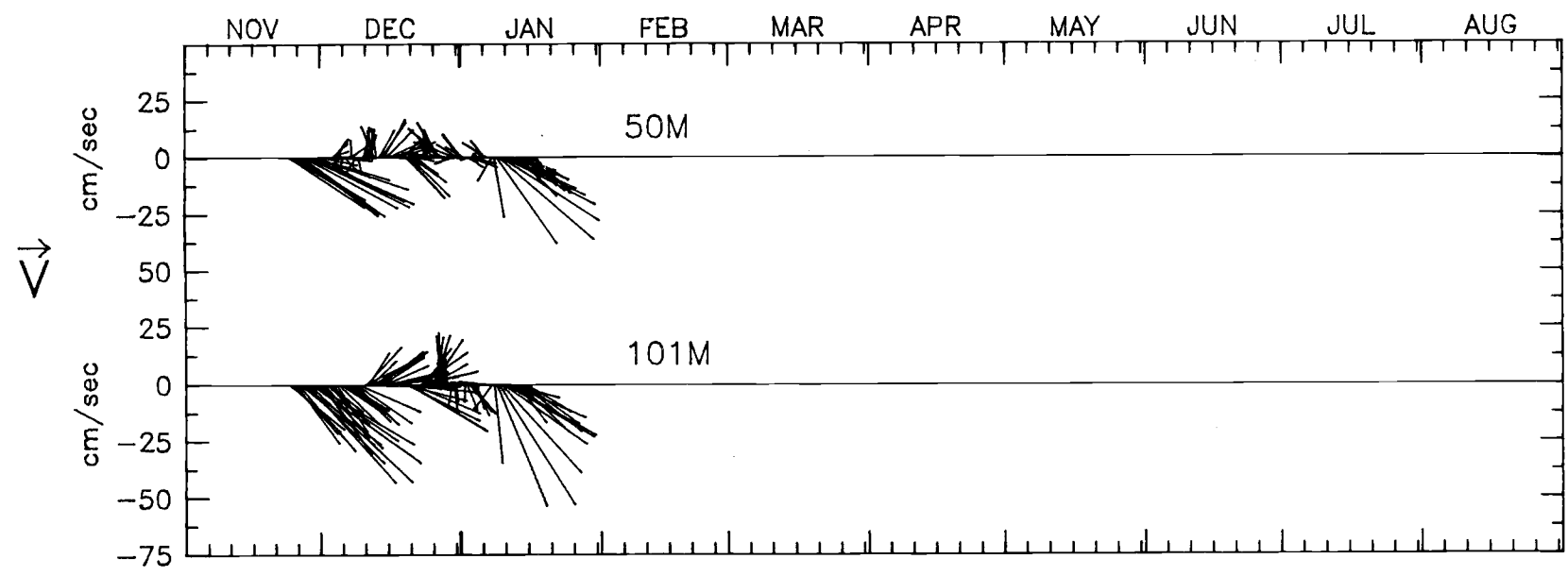


V



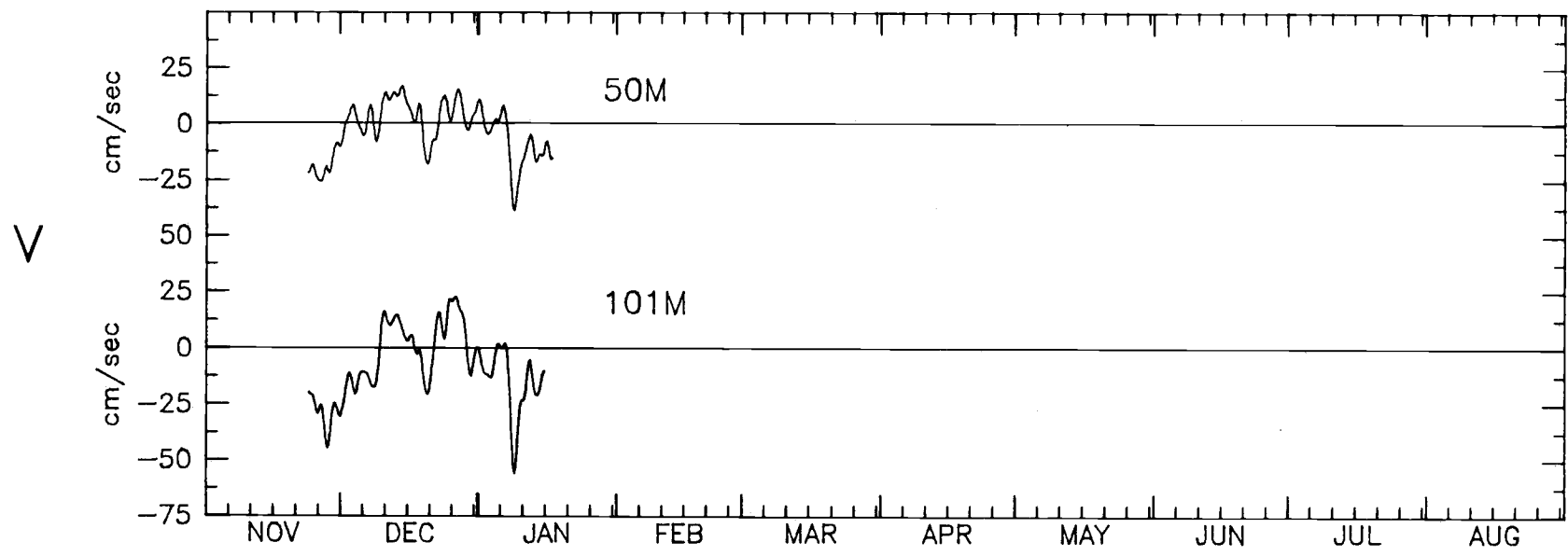
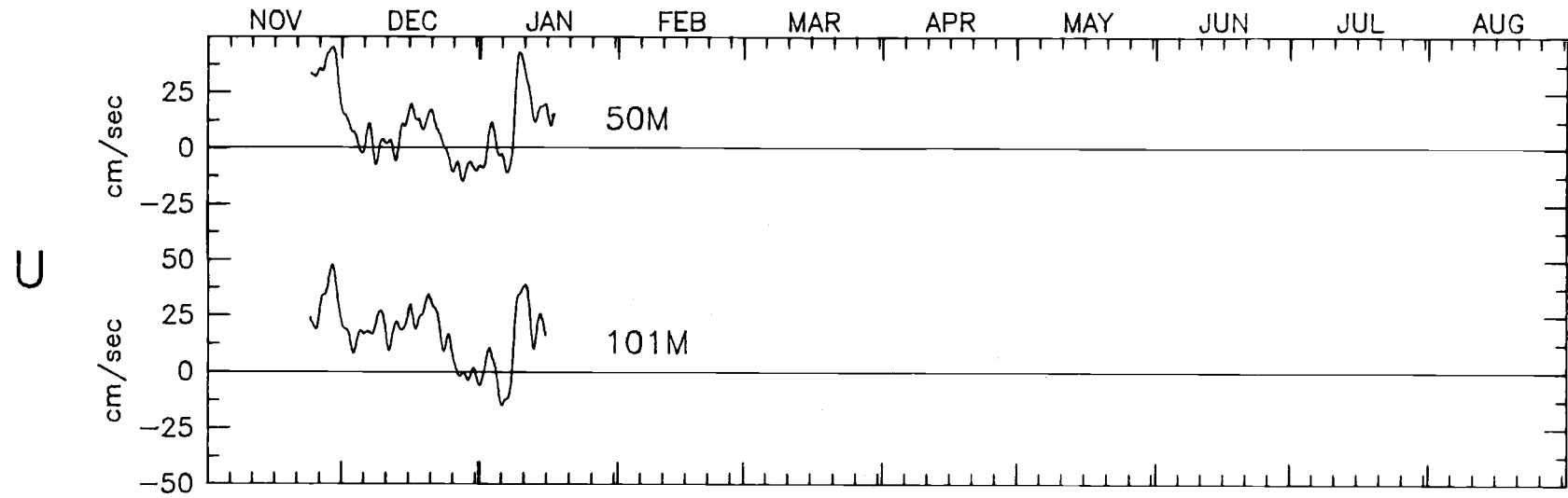
10 South Shelf Period II

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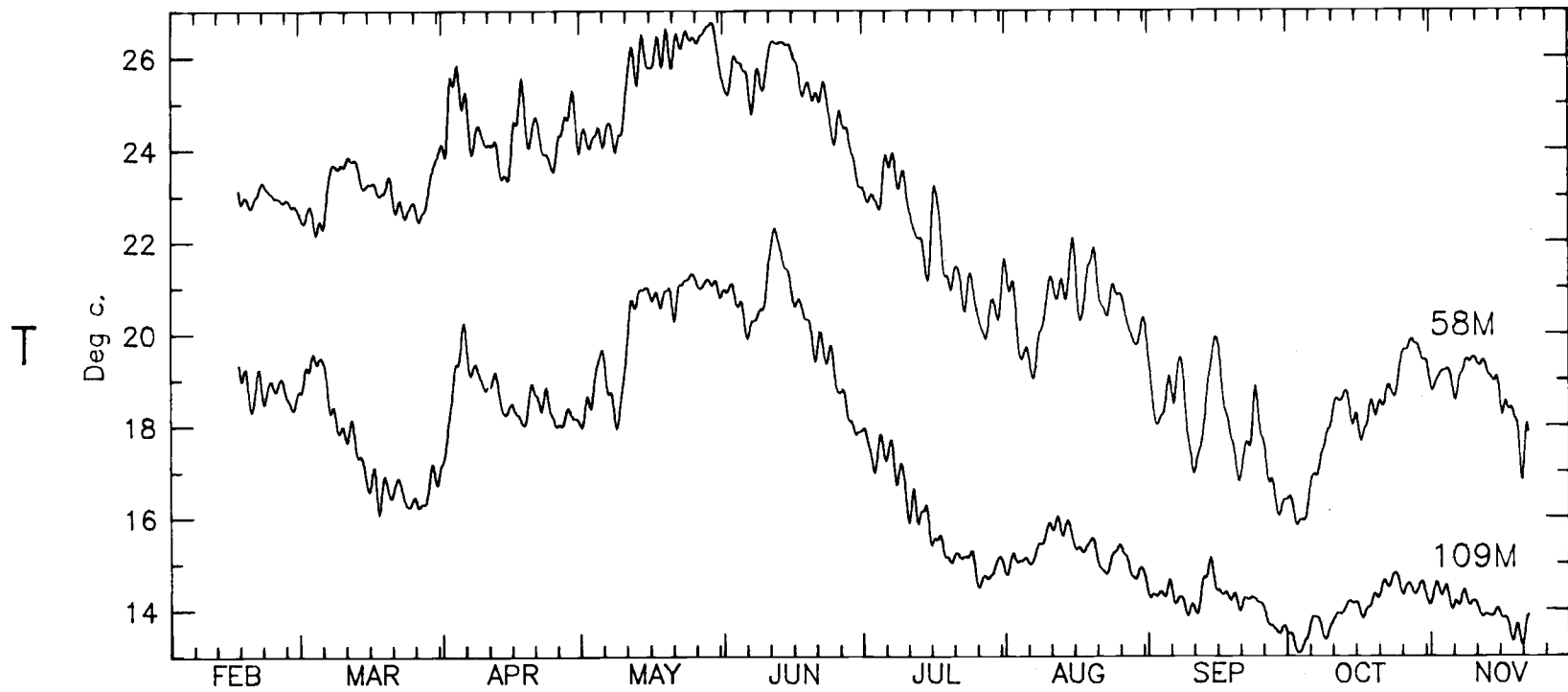
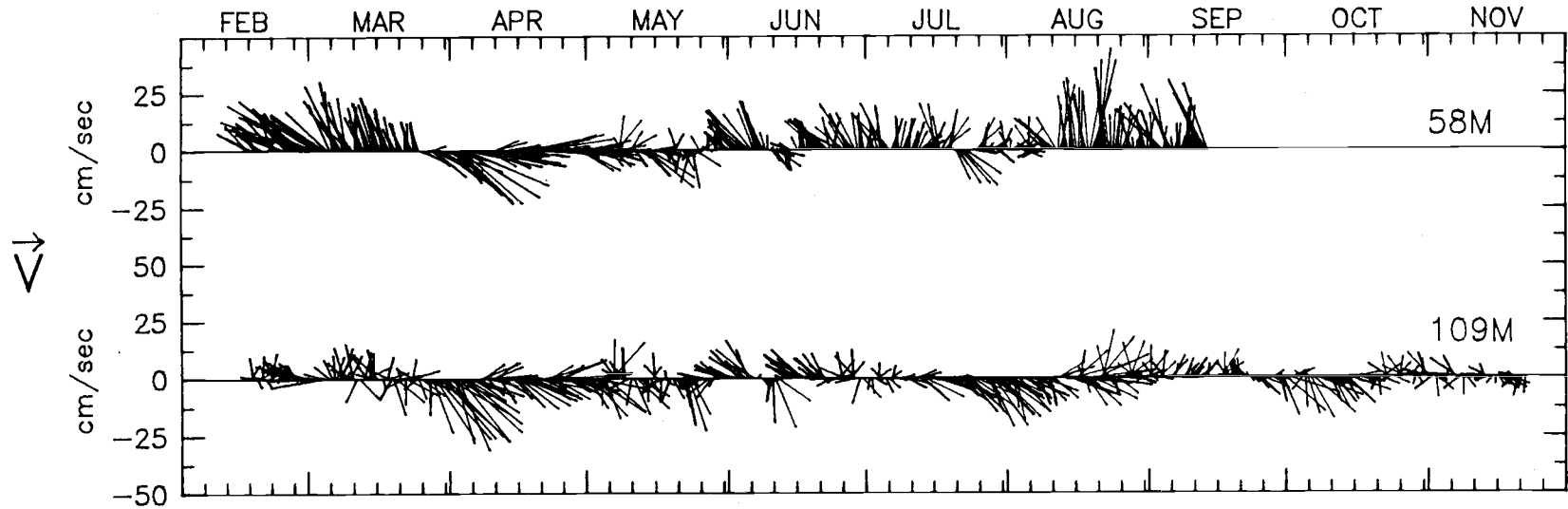
10 South Shelf Period III

1983



10 South Shelf Period III

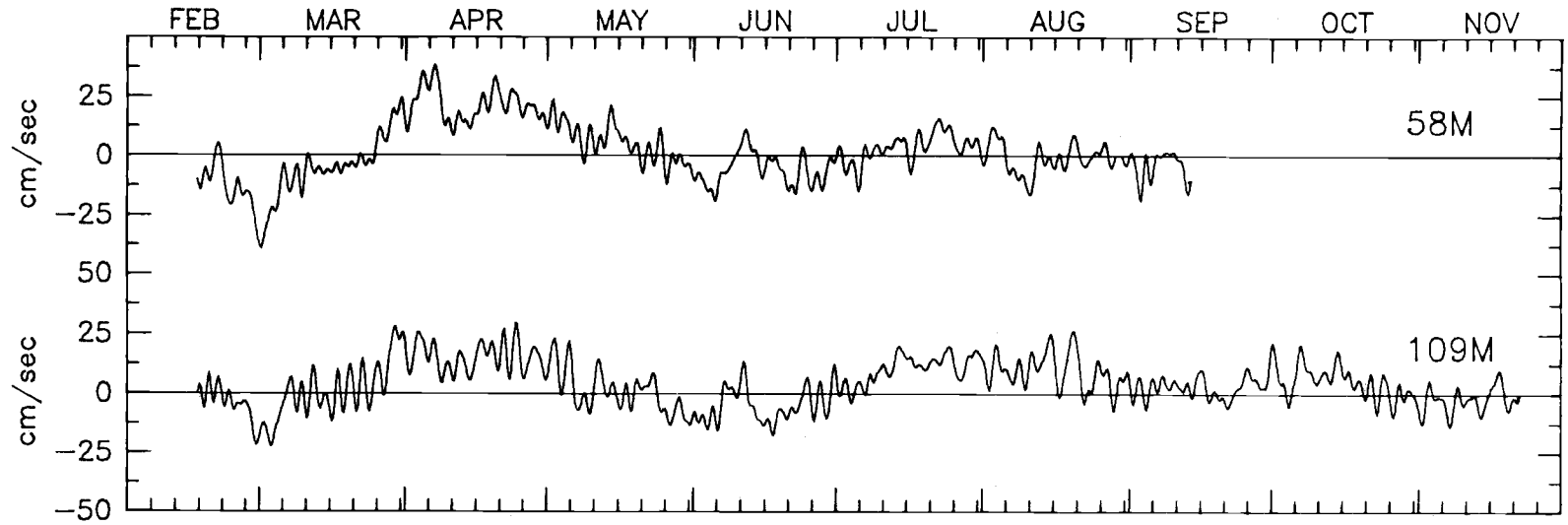
1983



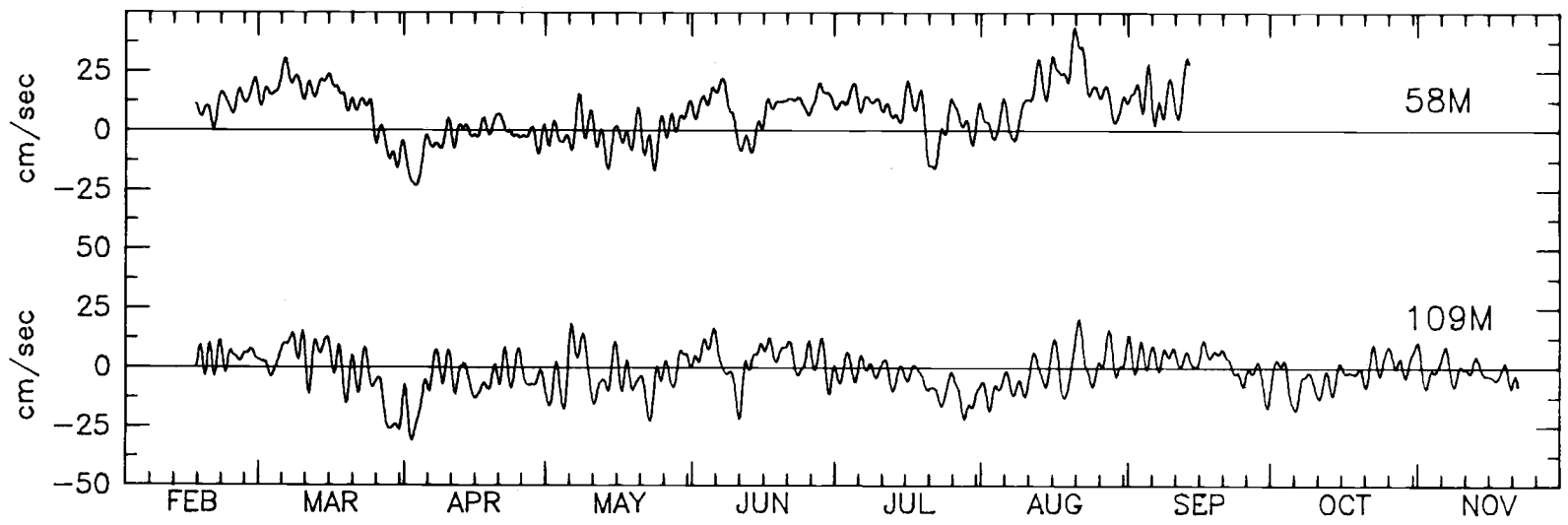
10 South Shelf Period IV

1983

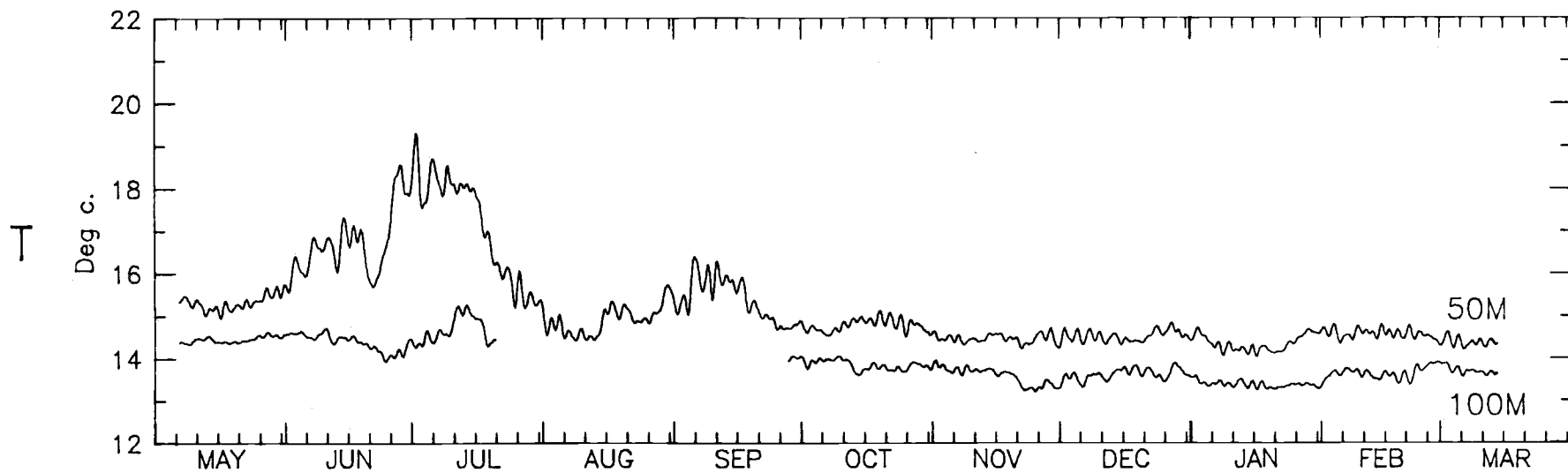
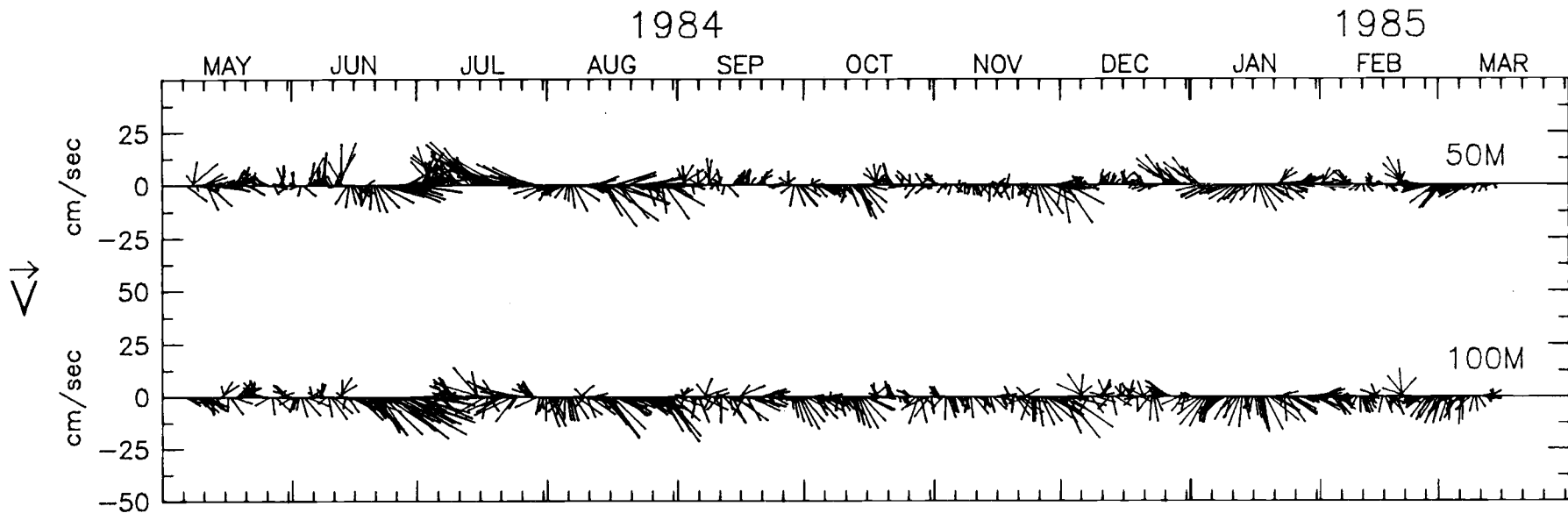
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V

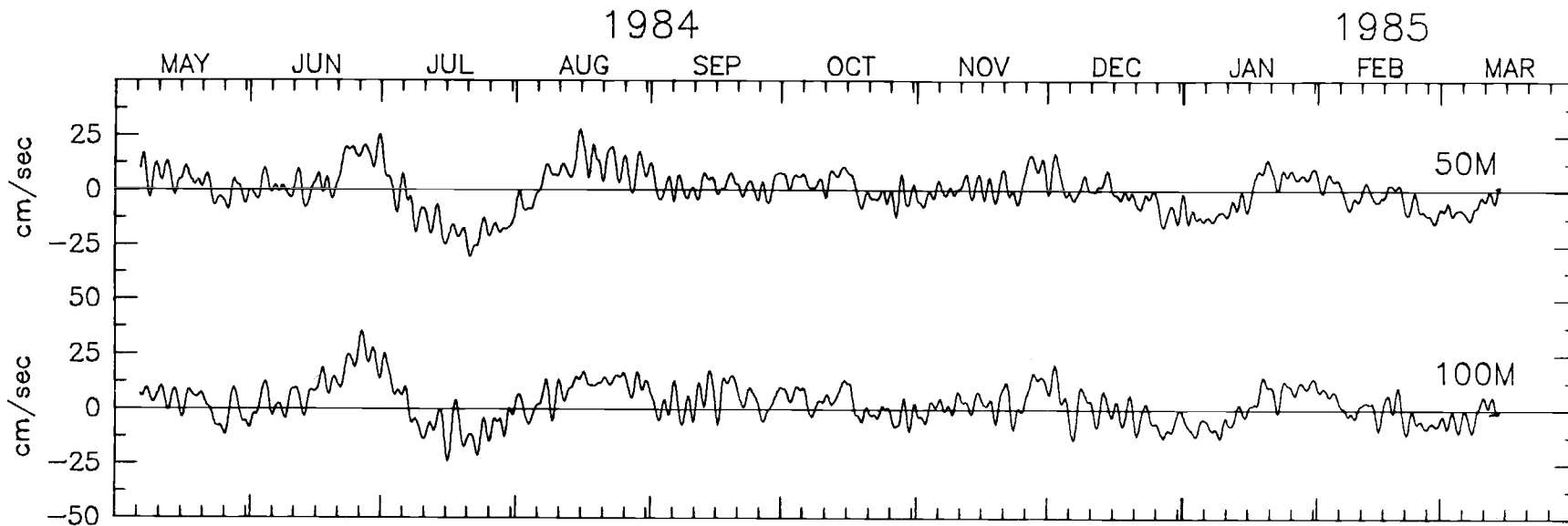


10 South Shelf Period IV

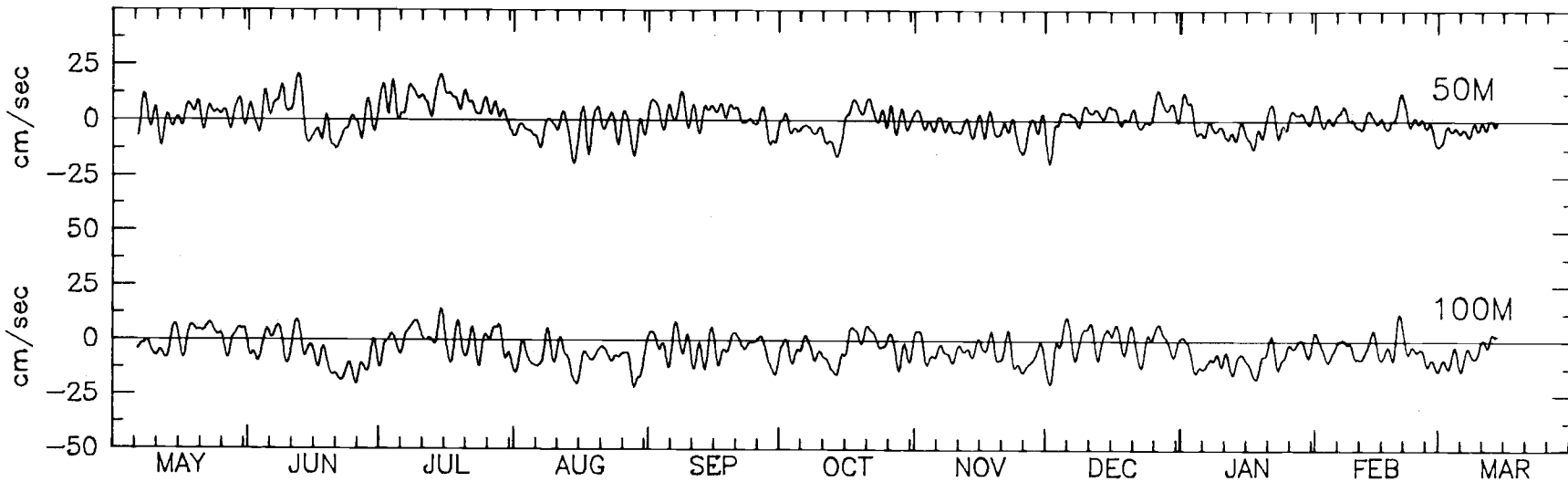


10 South Shelf Period VI

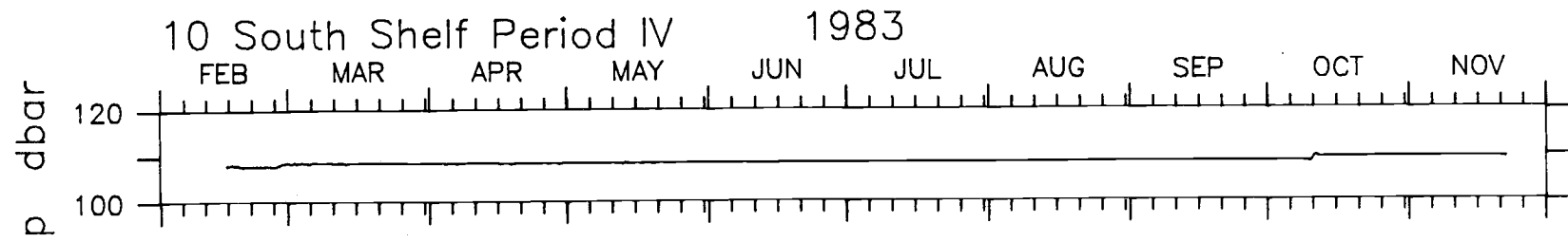
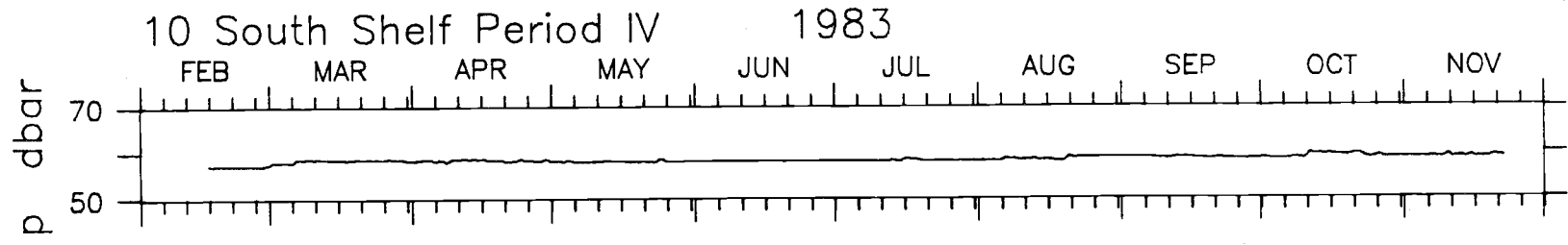
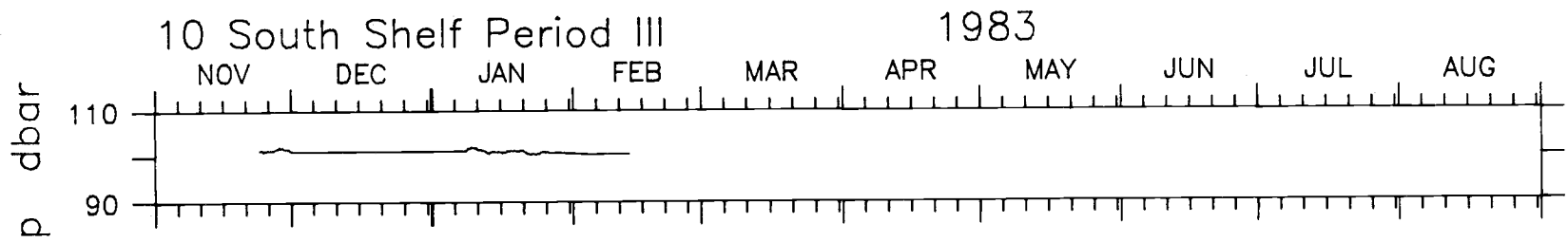
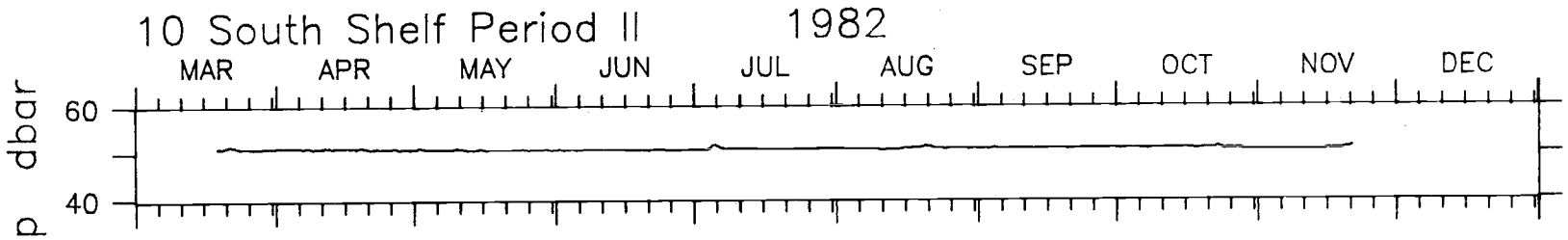
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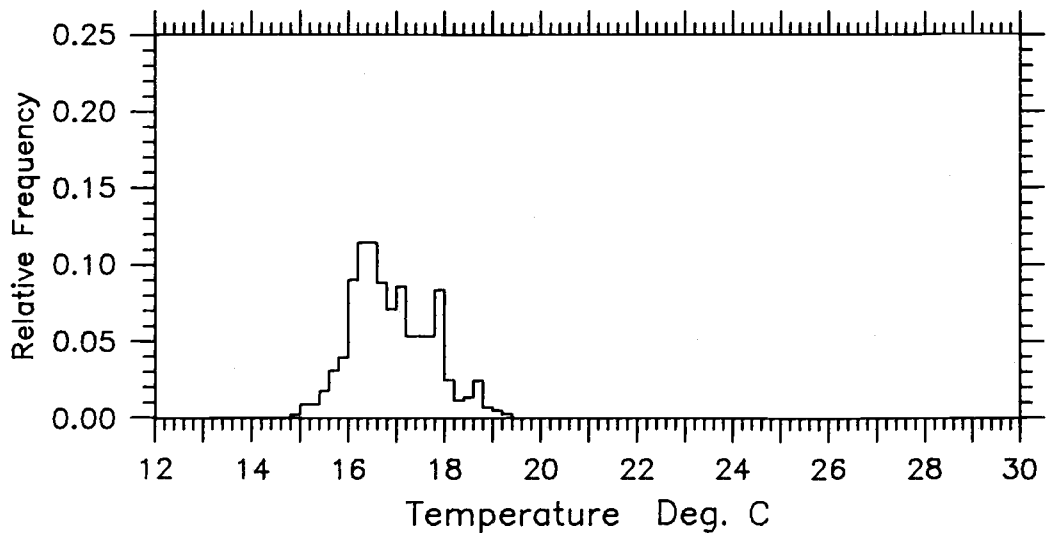
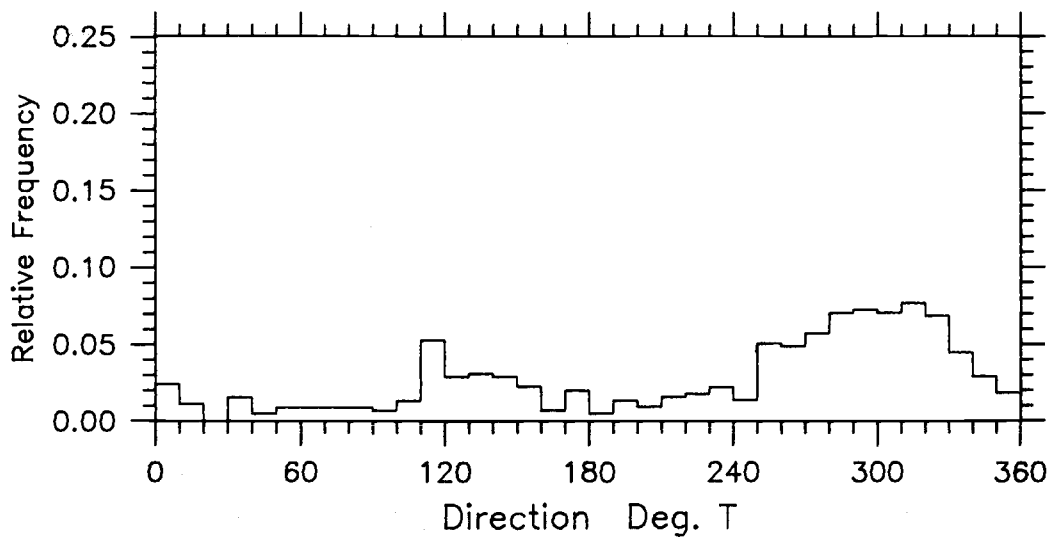
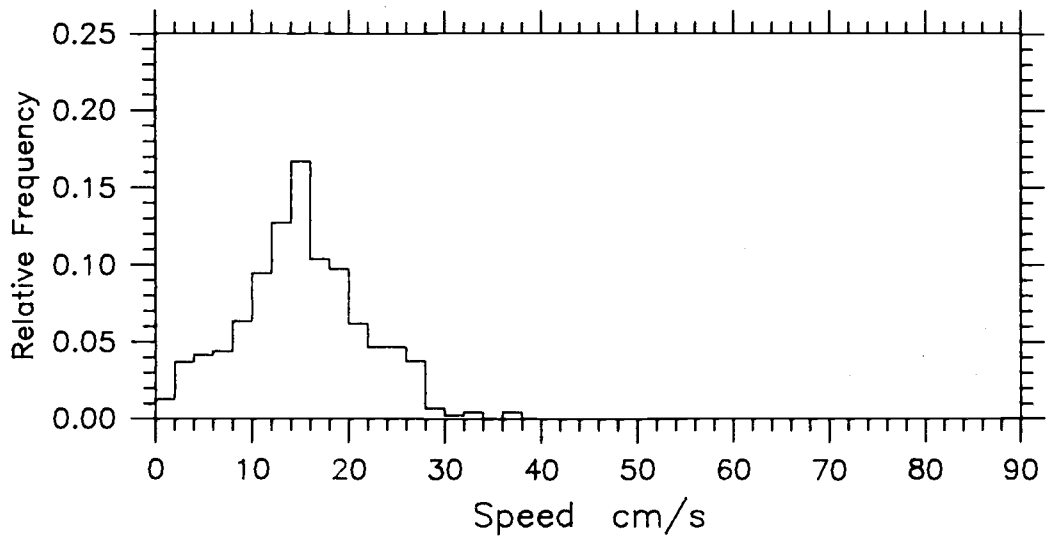


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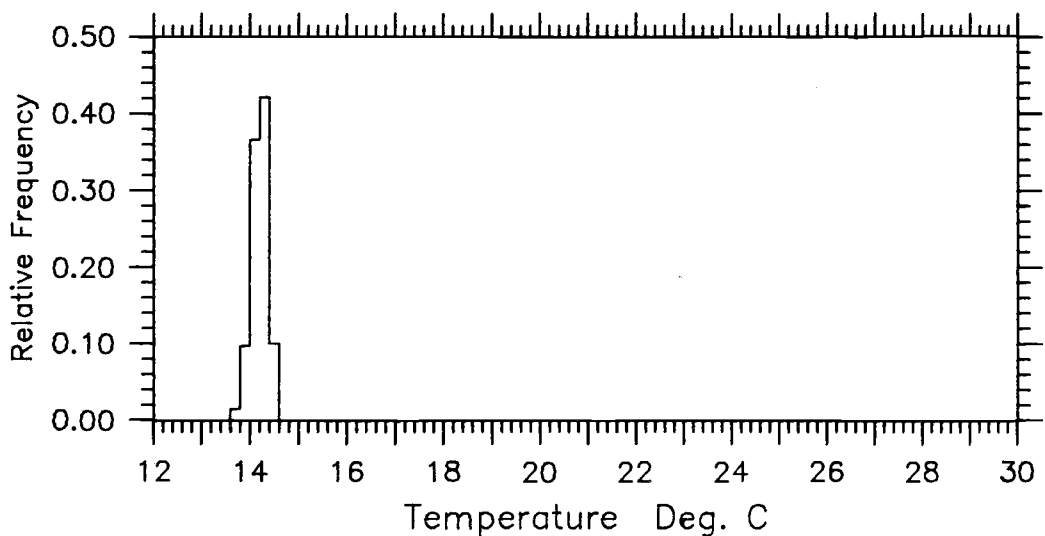
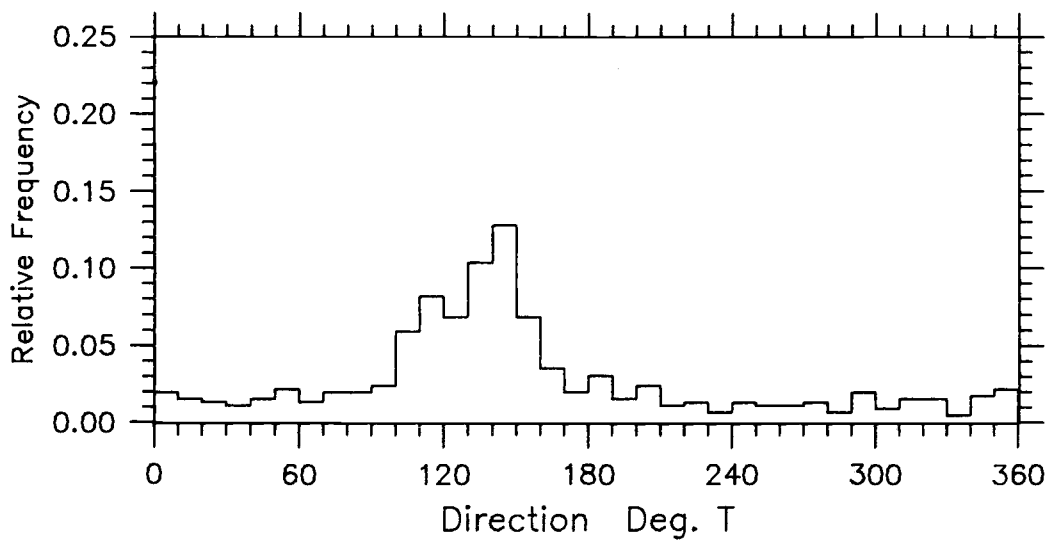
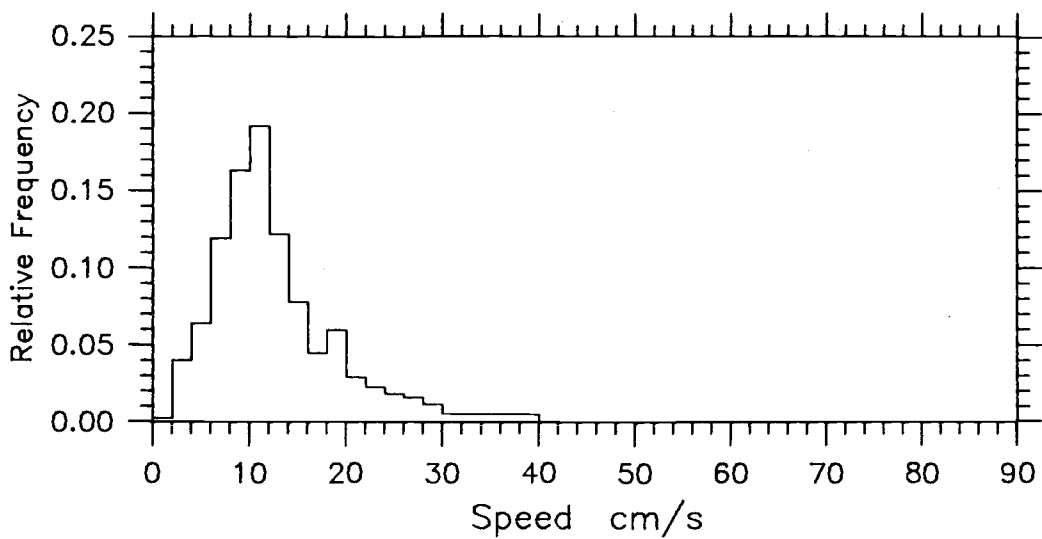


10 South Shelf Period VI

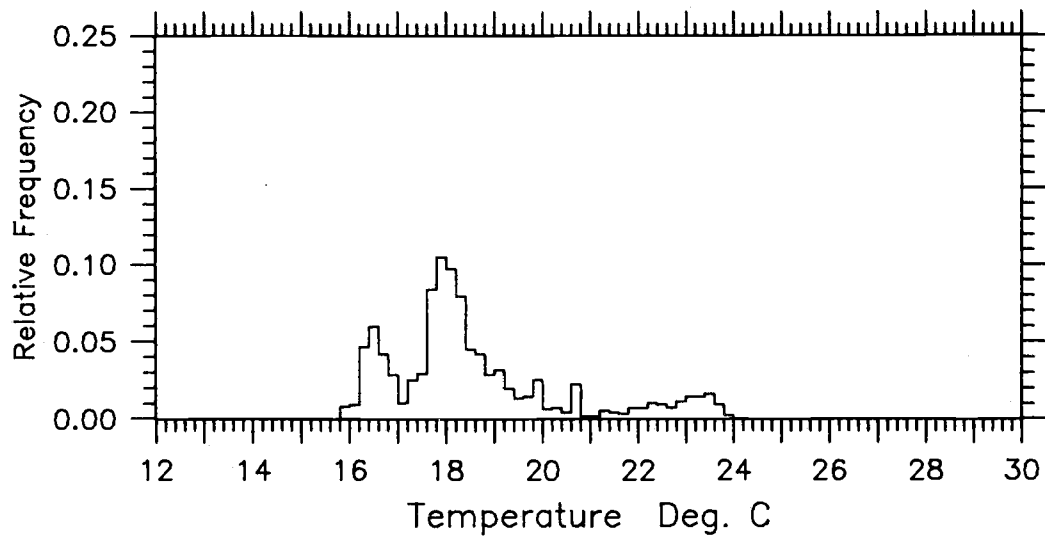
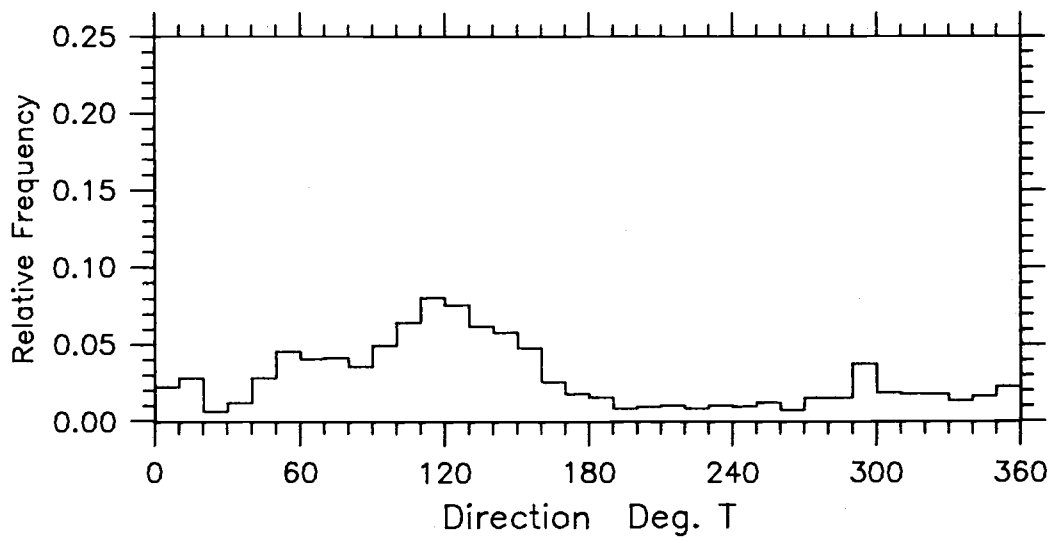
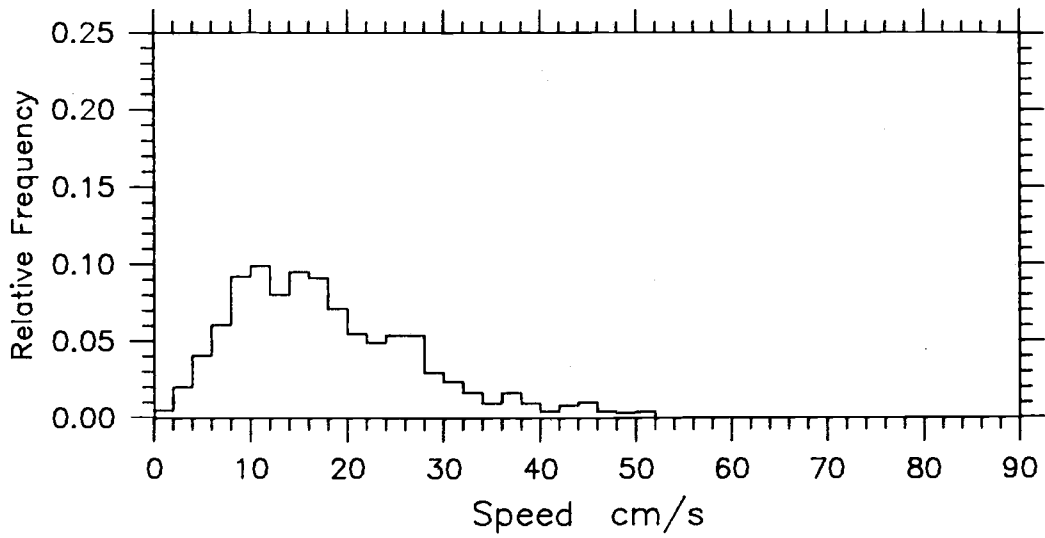




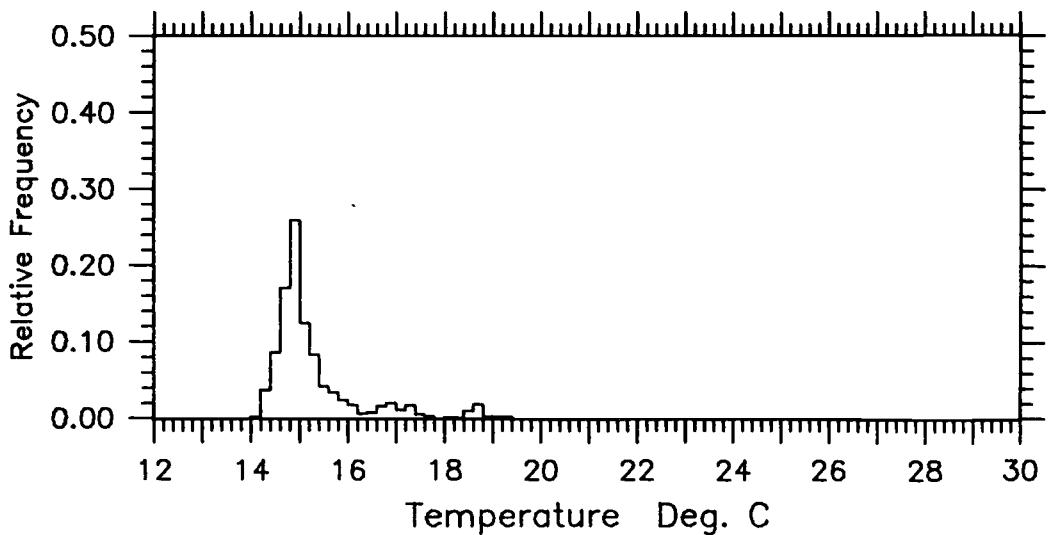
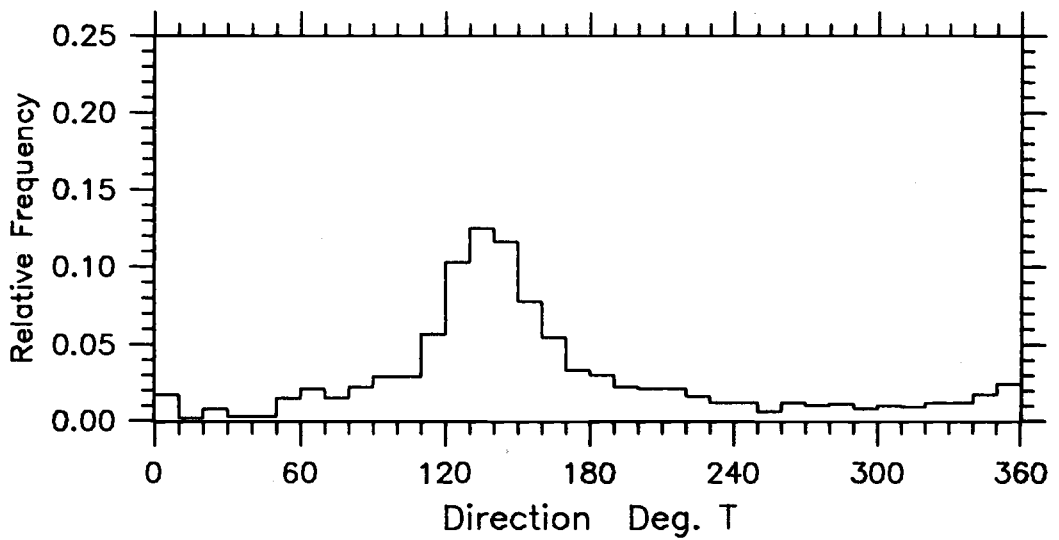
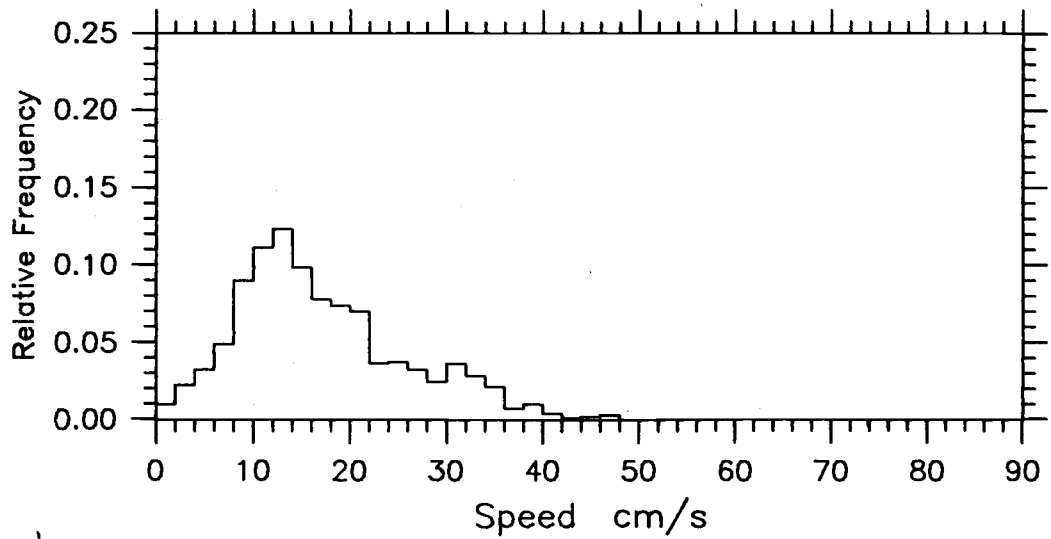
10 South Shelf Period I 50m



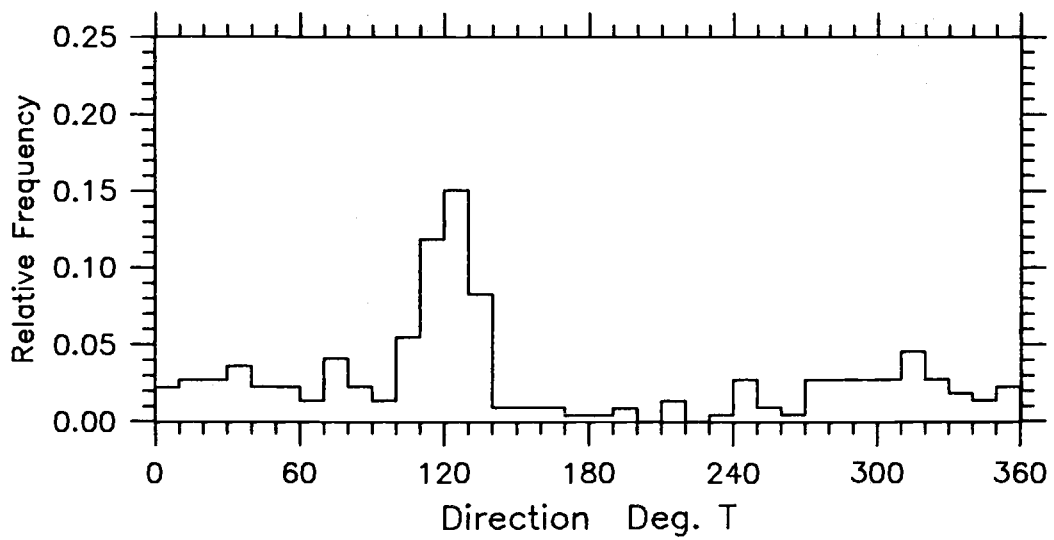
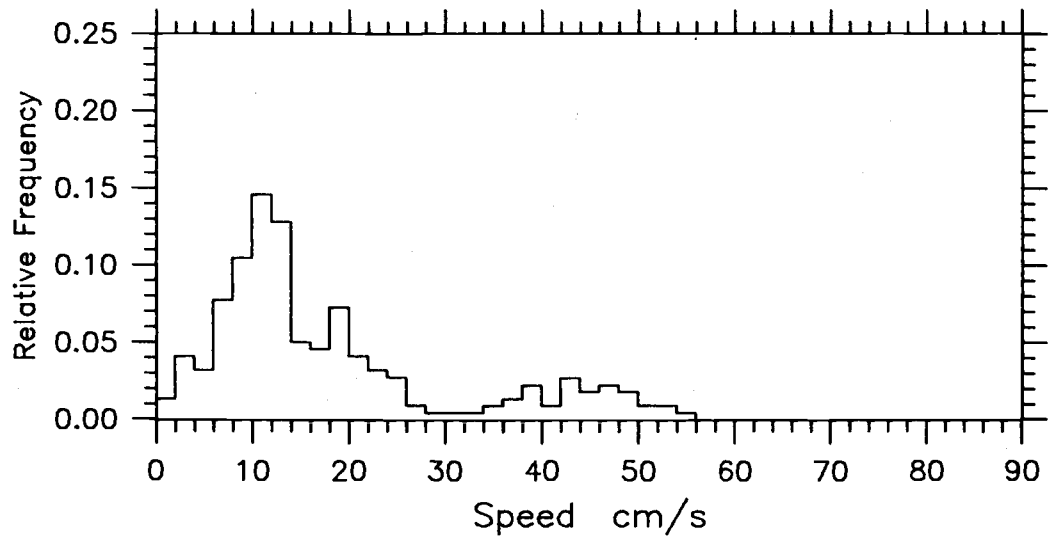
10 South Shelf Period I 100m



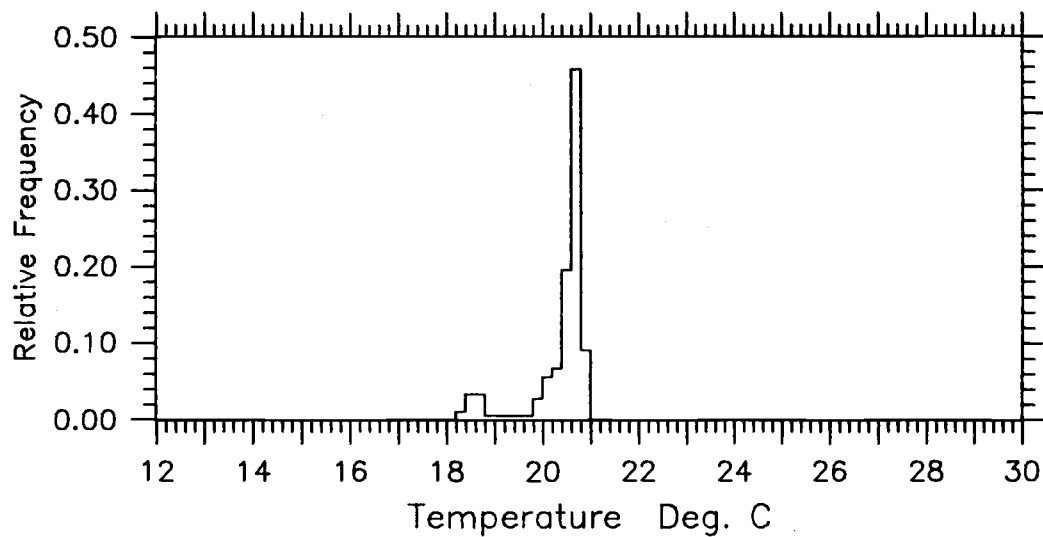
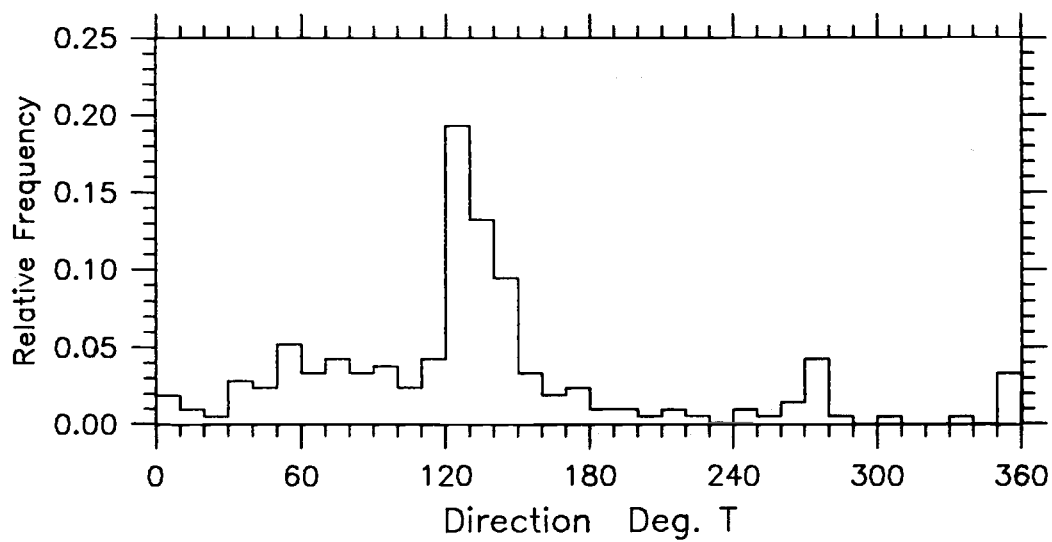
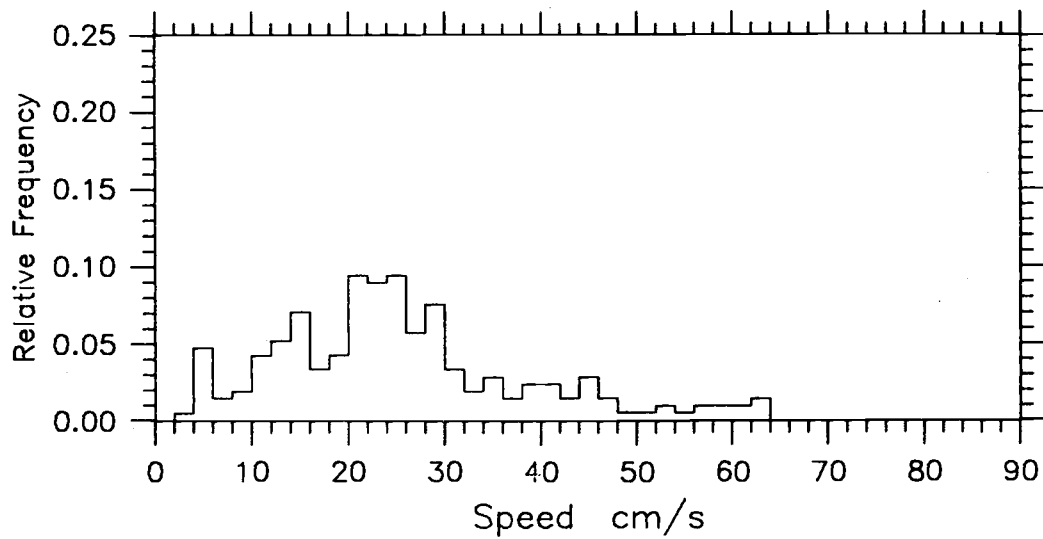
10 South Shelf Period II 51m



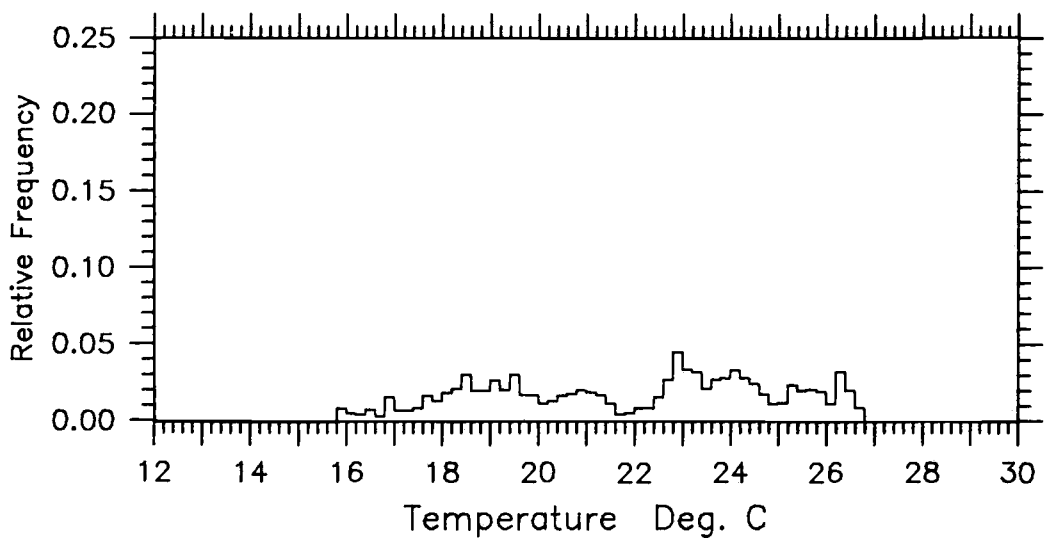
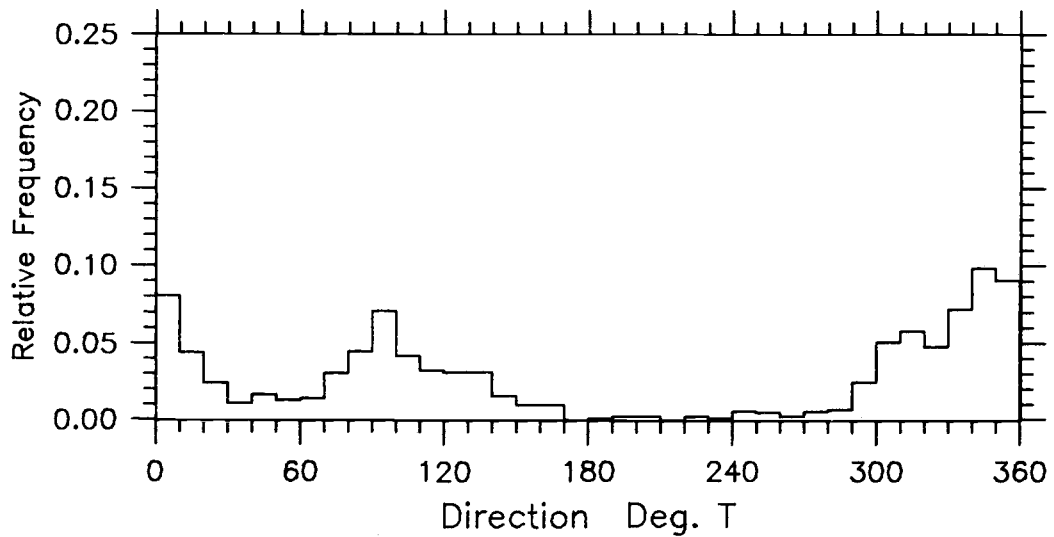
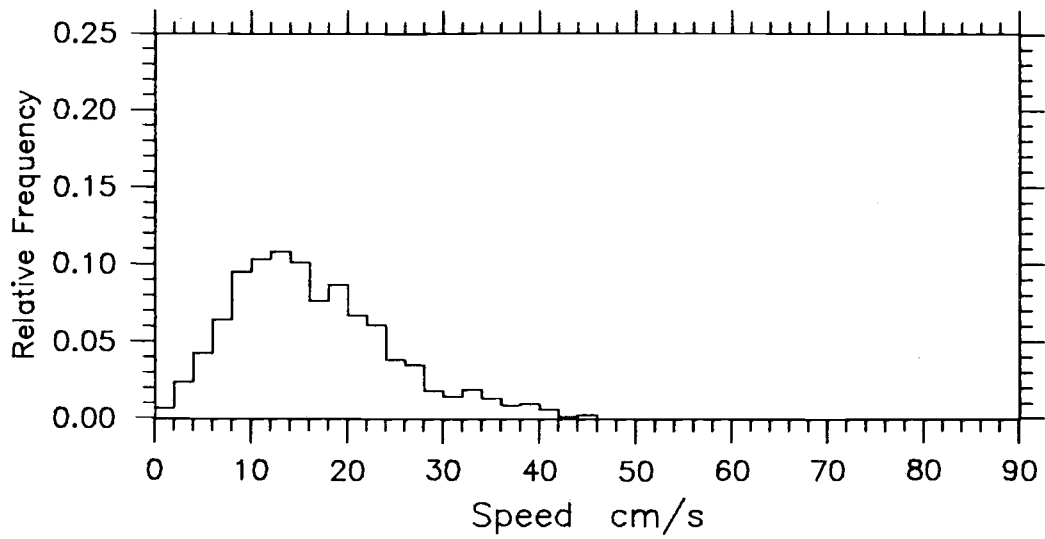
10 South Shelf Period II 101m



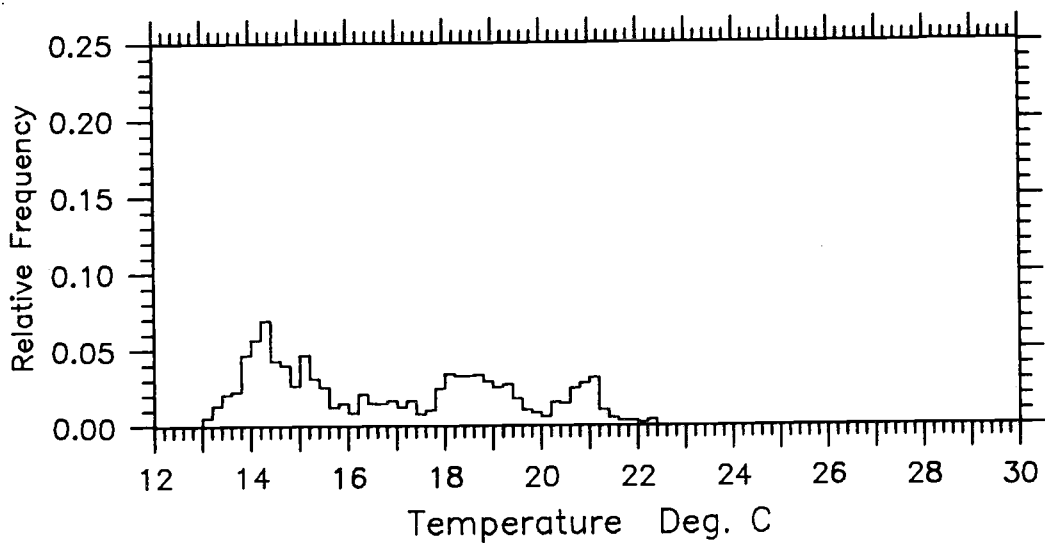
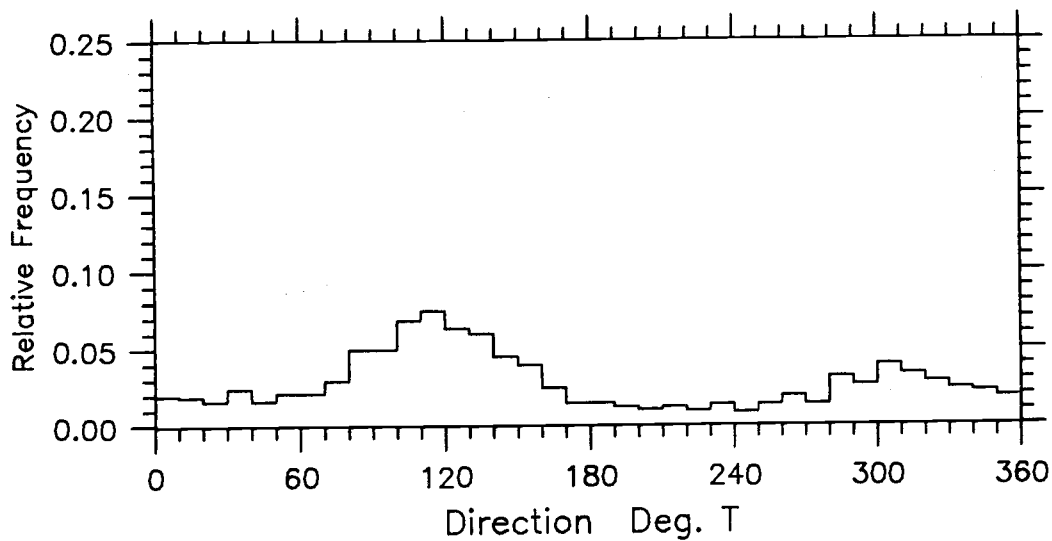
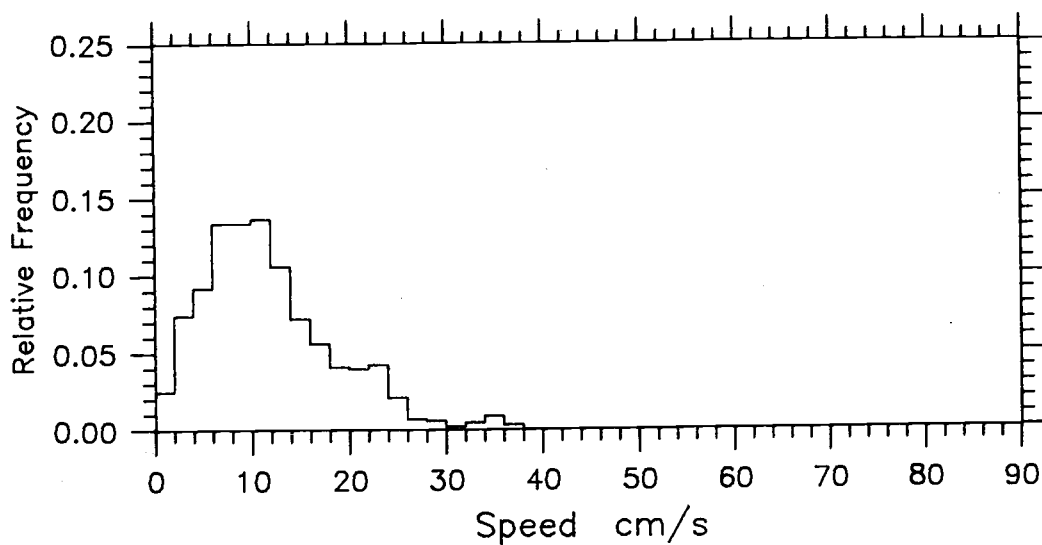
10 South Shelf Period III 50m



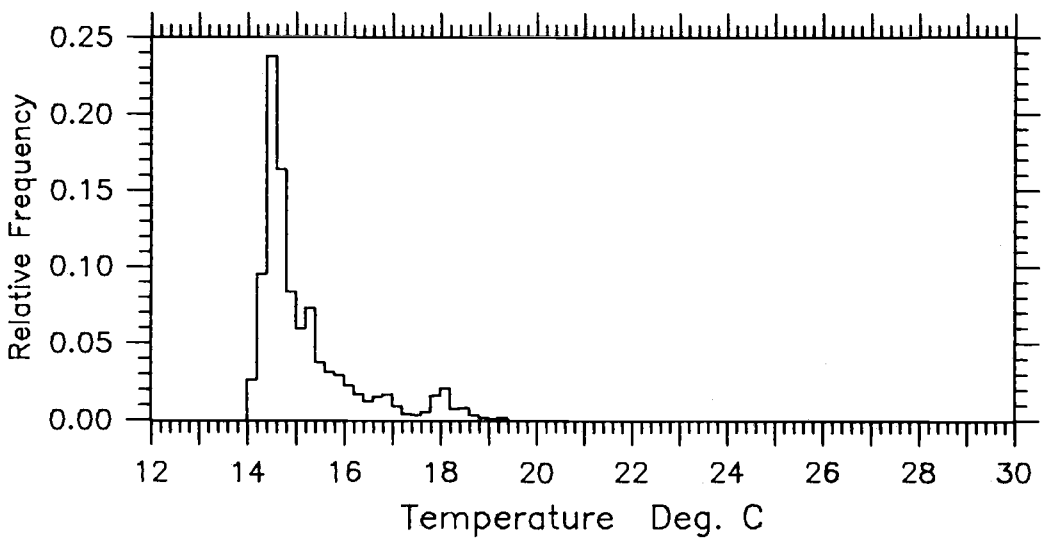
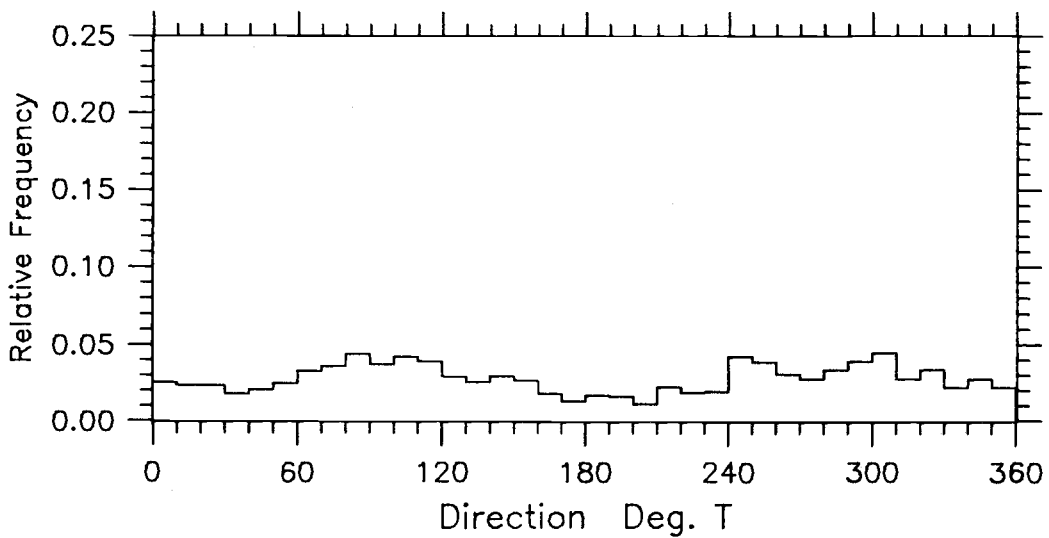
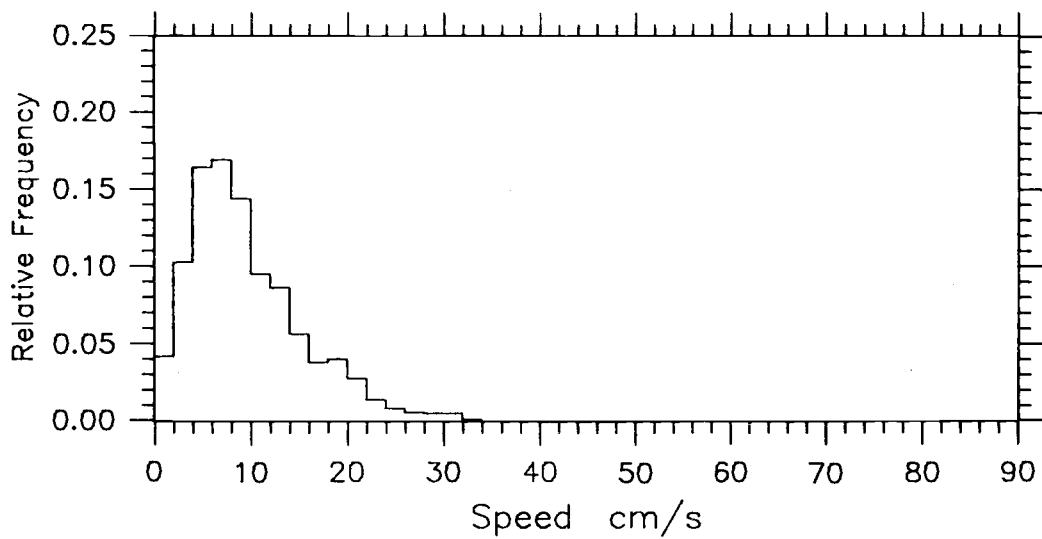
10 South Shelf Period III 101m



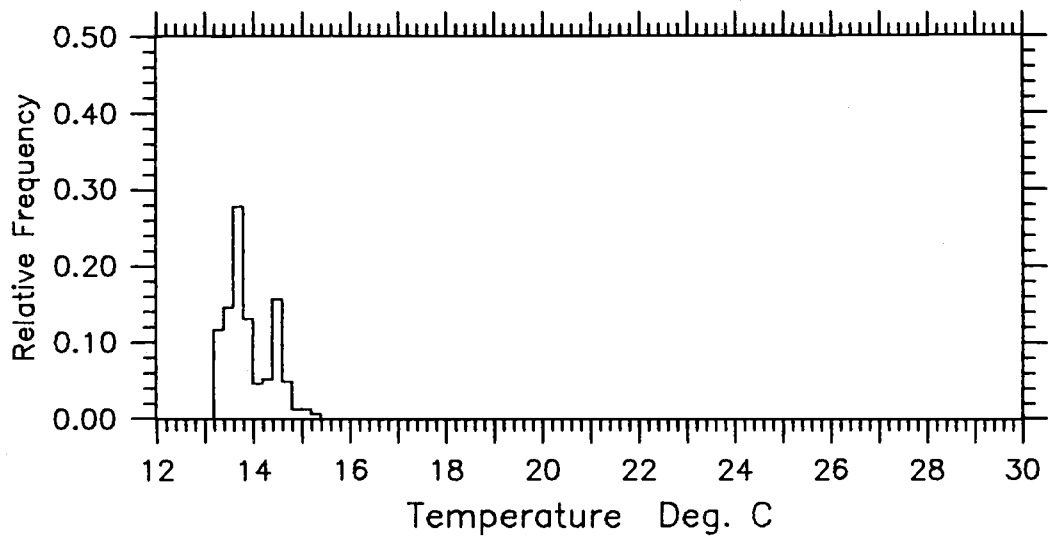
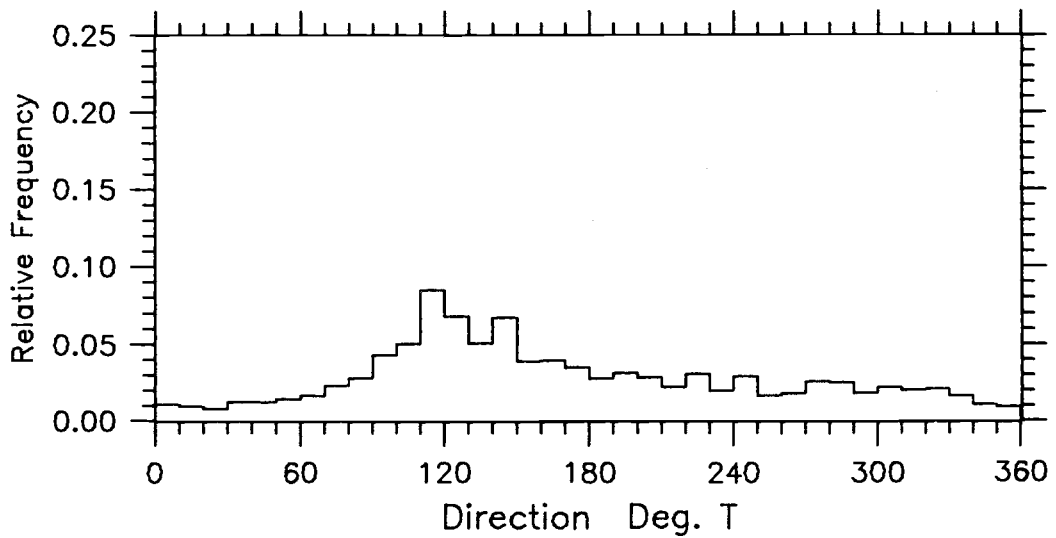
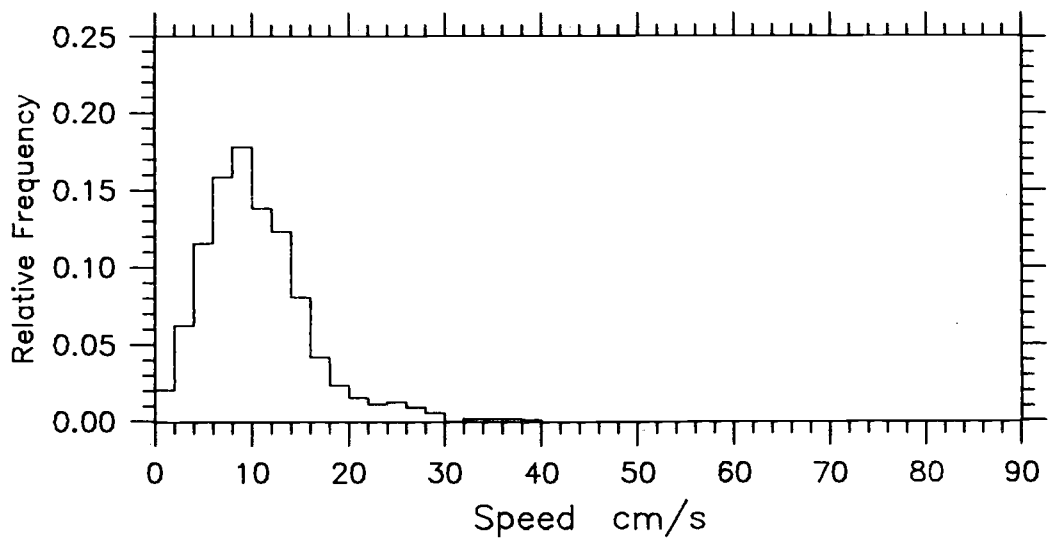
10 South Shelf Period IV 58m



10 South Shelf Period IV 109m



10 South Shelf Period VI 50m

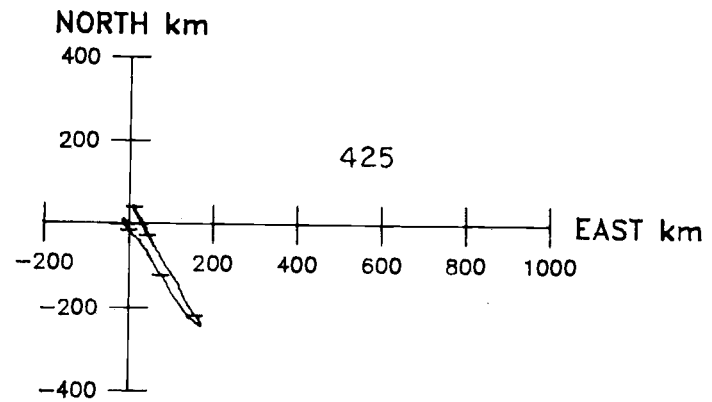
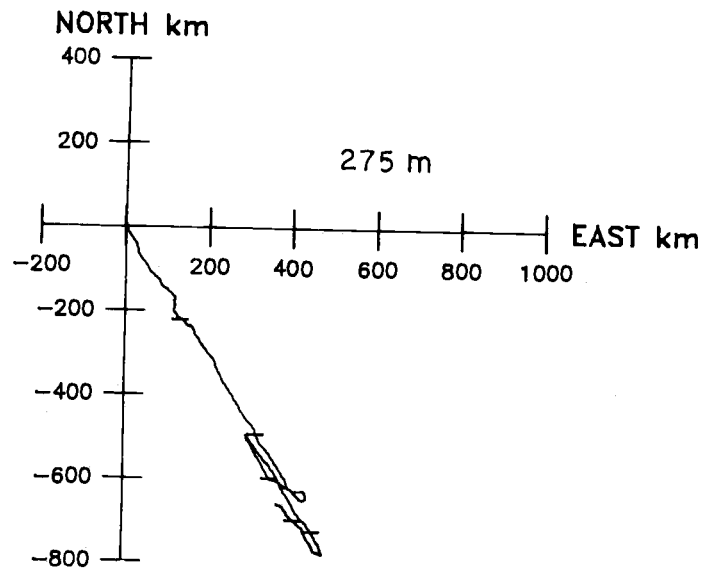
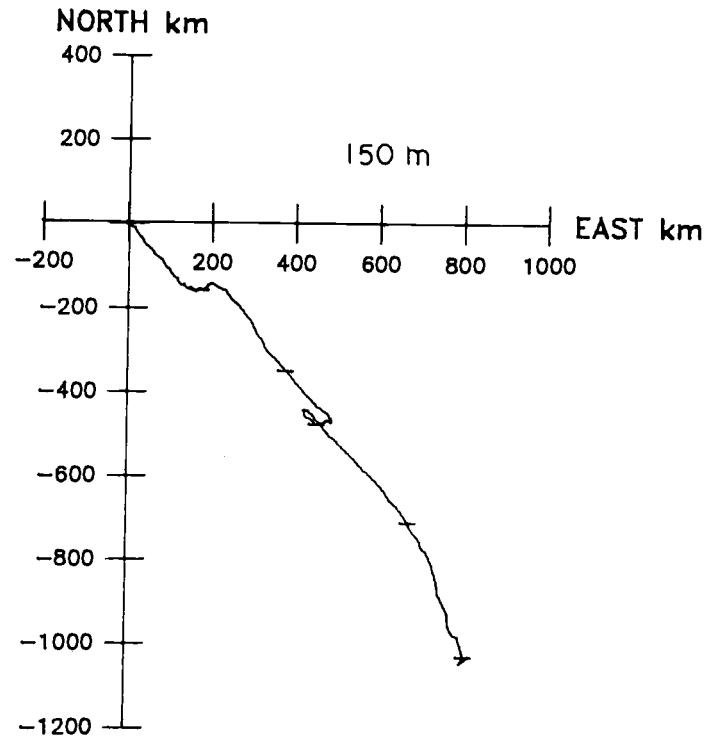
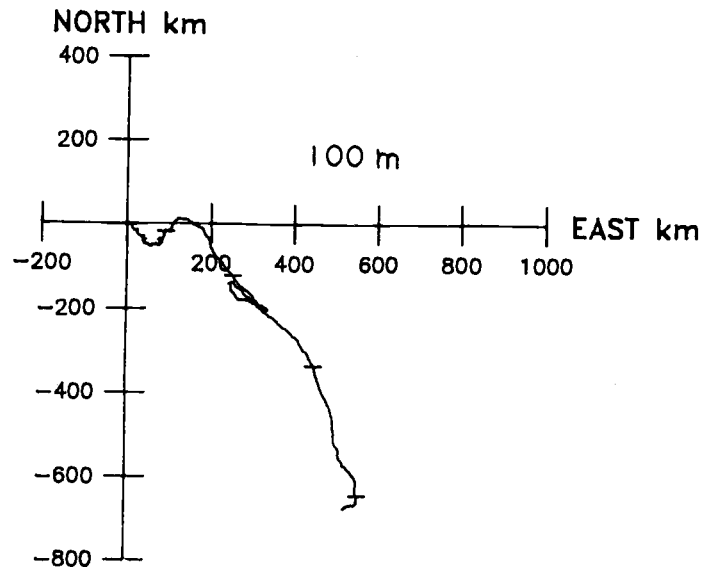


10 South Shelf Period VI 100m

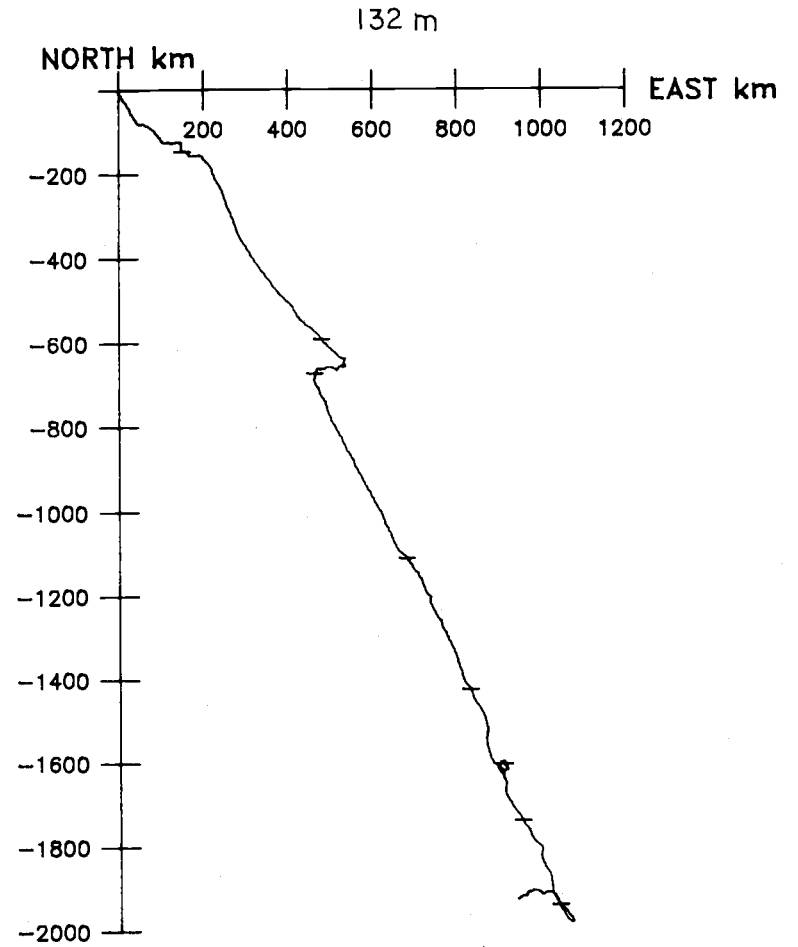
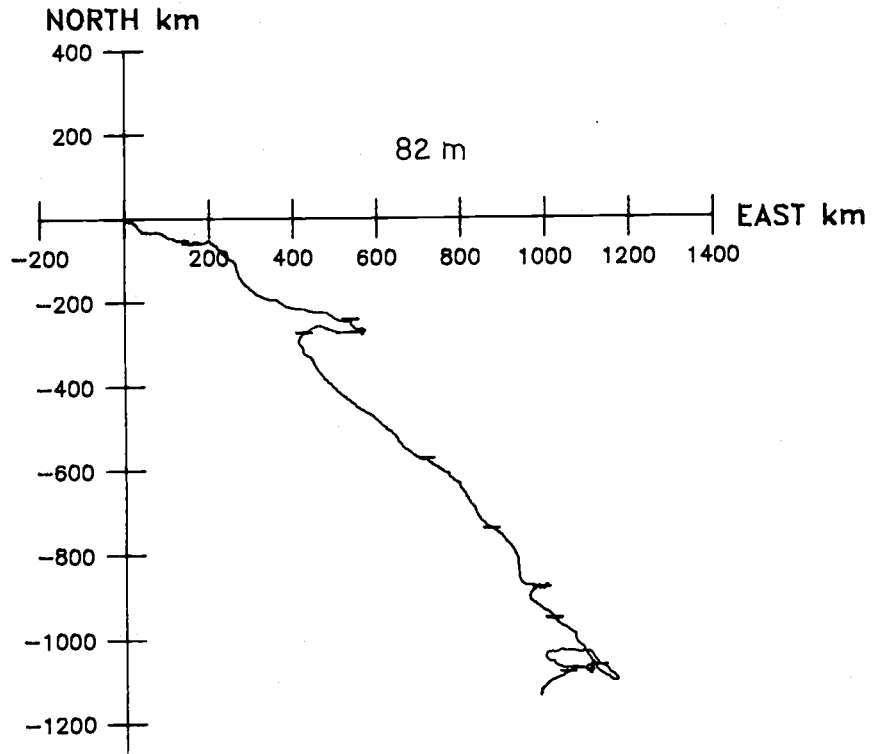
MOORING 10 SOUTH INNER SLOPE

MOORING 10 South Inner Slope

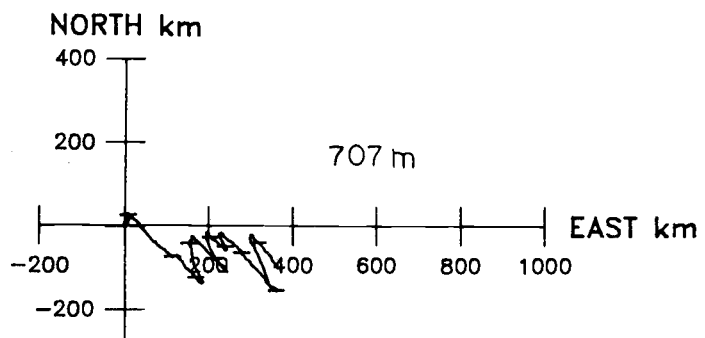
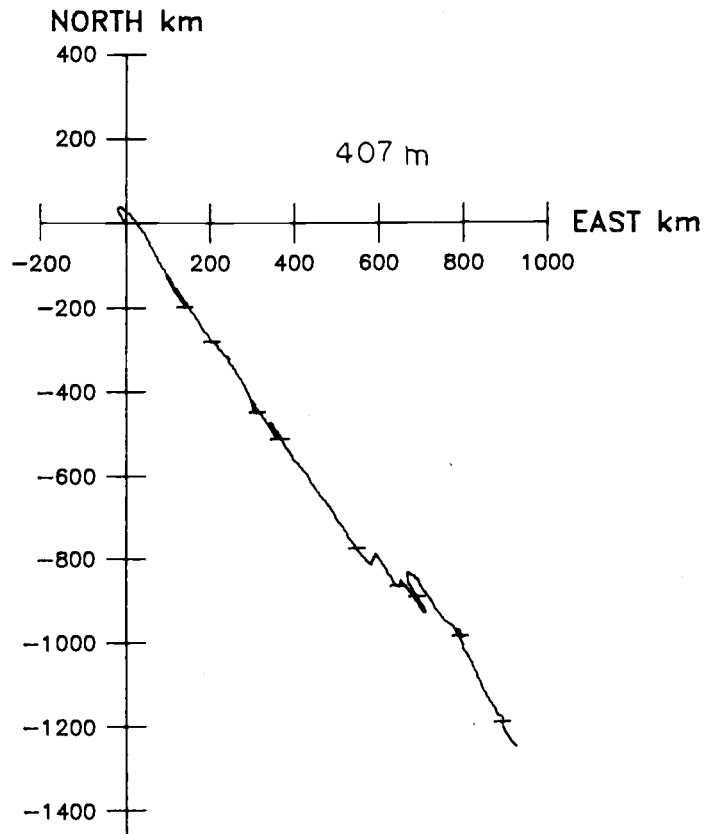
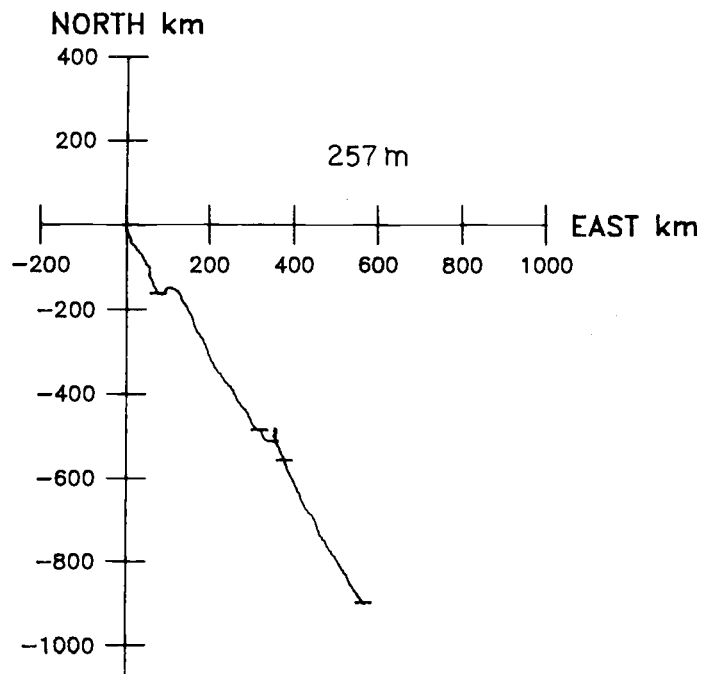
PERIOD	INSTRUMENT DEPTH [m]	DATA U,V	POINTS T	MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
				U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED	DIRECTION	AXIS
							[Deg.C]	[Deg.C]	[cm/s]	[Deg.T]	[Deg.T]
V	100	640	640	3.8 (6.3)	-4.9 (7.5)	14.19 (0.25)	13.68	14.90	6.2	142.5	-35.6
	150	639	639	5.8 (6.6)	-7.6 (7.8)	13.45 (0.40)	12.66	14.18	9.5	142.6	-38.2
	275	639	639	2.7 (7.4)	-4.8 (10.3)	12.03 (0.48)	11.18	13.33	5.5	151.0	-34.6
	425	640	640	0.4 (4.8)	-0.4 (7.3)	9.40 (0.44)	8.45	10.29	0.6	131.7	-32.4
VI	82	1251	1251	3.6 (8.8)	-4.2 (6.6)	14.66 (0.64)	13.76	16.87	5.6	139.0	-59.5
	132	1021	1251	4.3 (7.2)	-8.7 (9.5)	13.92 (0.36)	13.07	14.83	9.7	153.8	-33.4
	257	482	956	5.5 (5.1)	-8.7 (8.1)	12.44 (0.46)	11.51	13.84	10.3	147.6	-27.0
	407	1251	1251	3.4 (5.0)	-4.6 (7.6)	9.85 (0.36)	8.78	10.84	5.7	143.4	-31.7
	707	1251	1251	1.4 (3.5)	-0.4 (4.8)	6.22 (0.26)	5.46	7.05	1.4	105.3	-35.0



10 South Inner Slope Period V

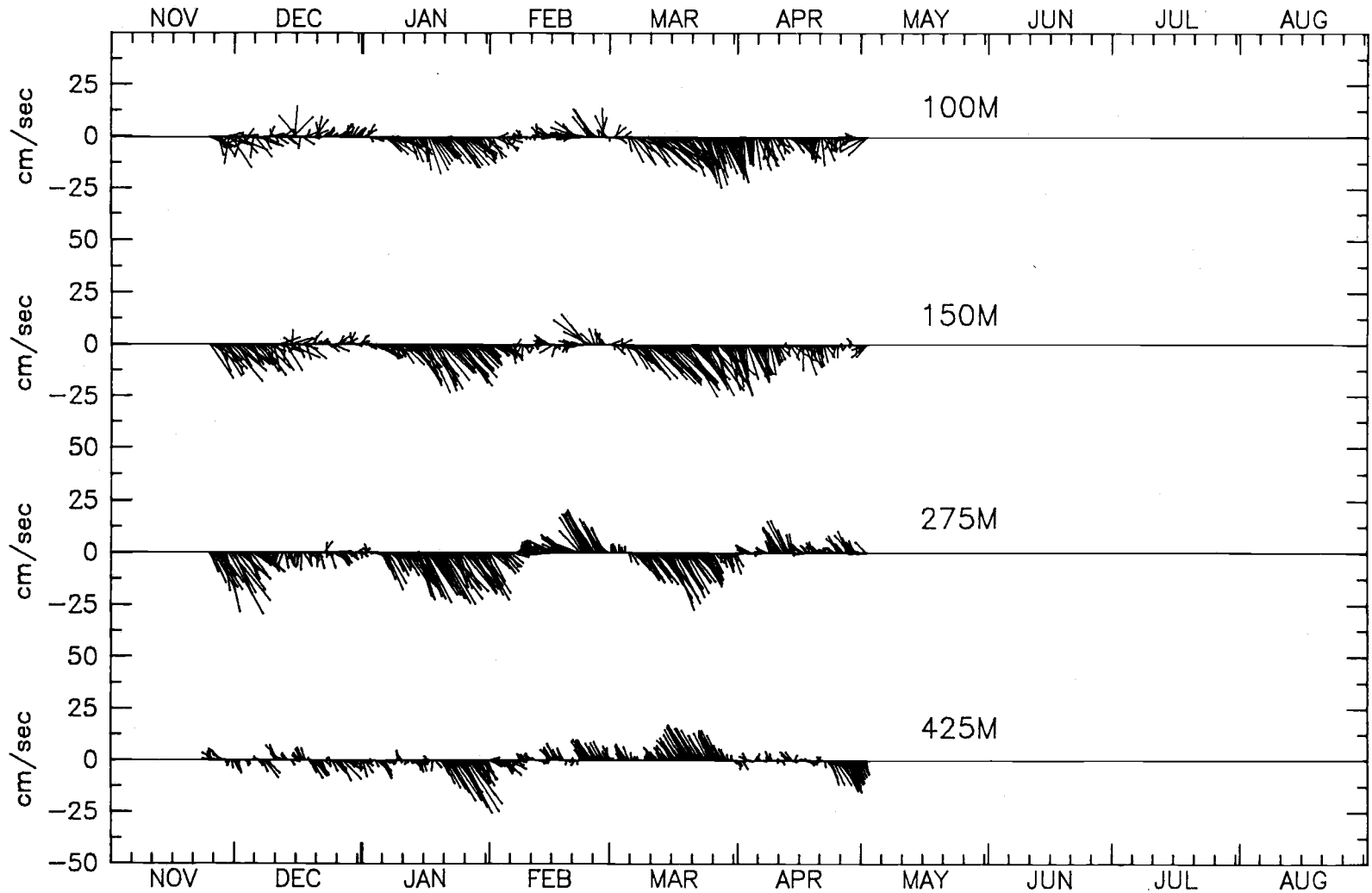


10 South Inner Slope Period VI



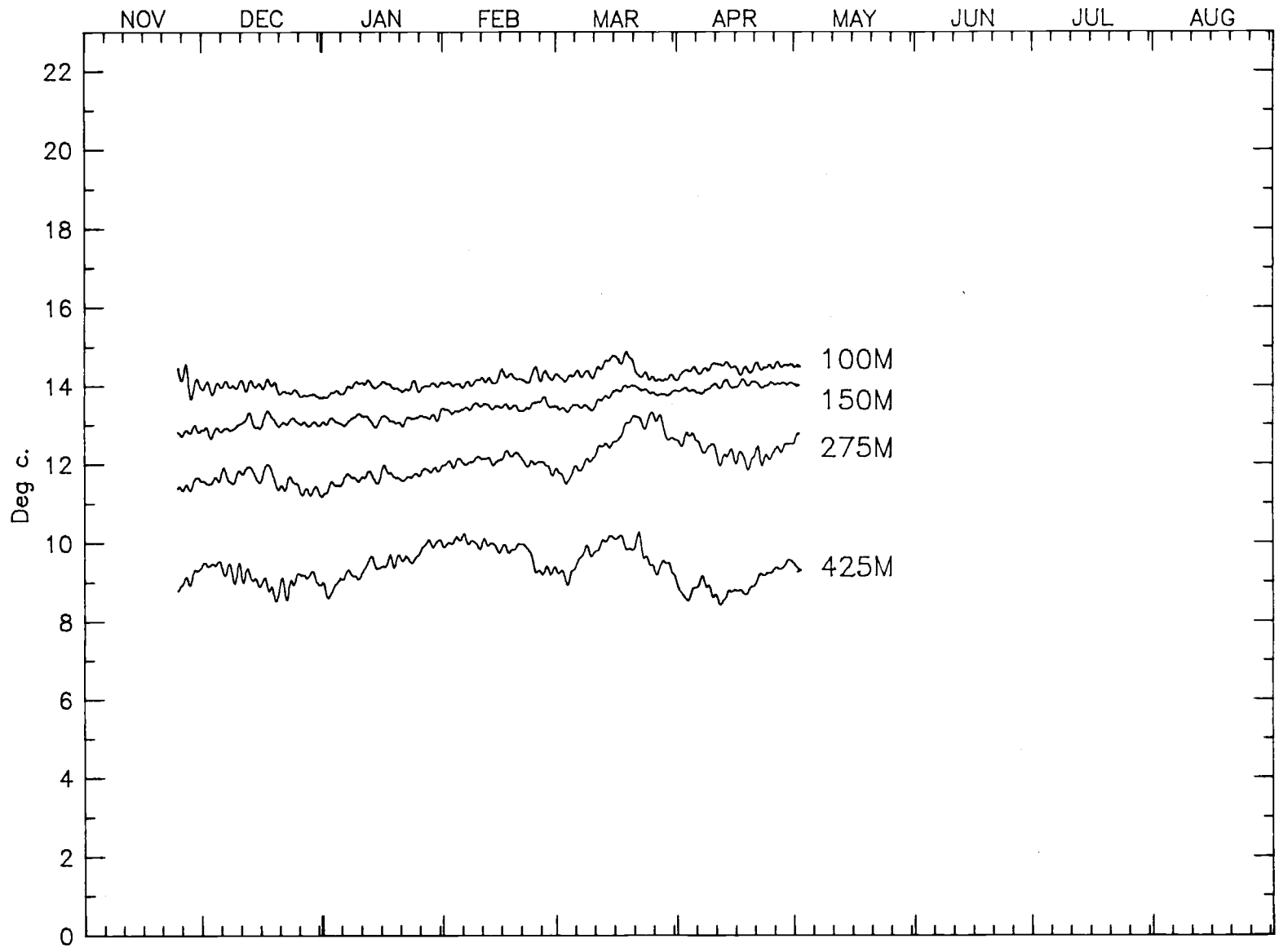
10 South Inner Slope Period VI

1984



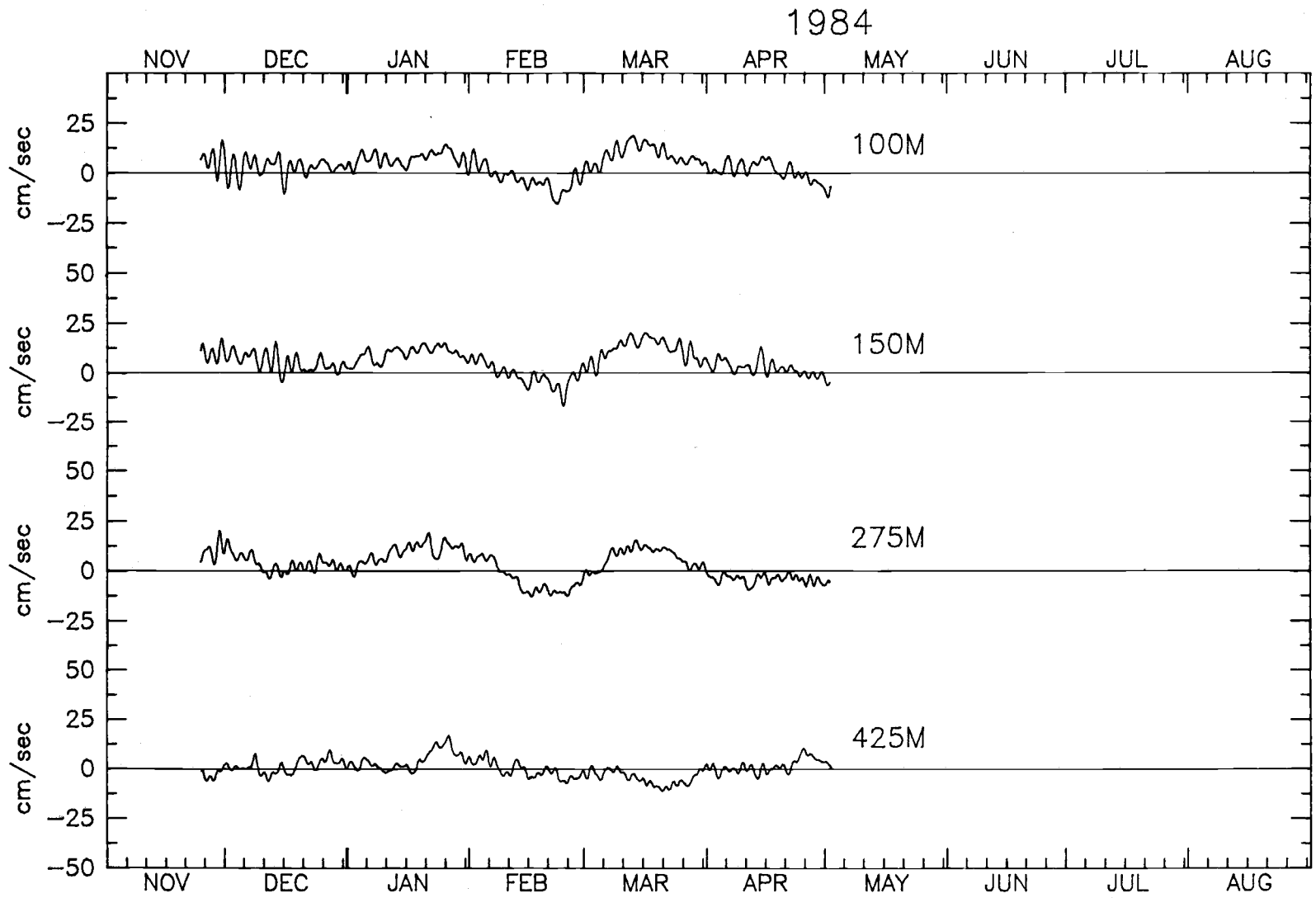
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1984



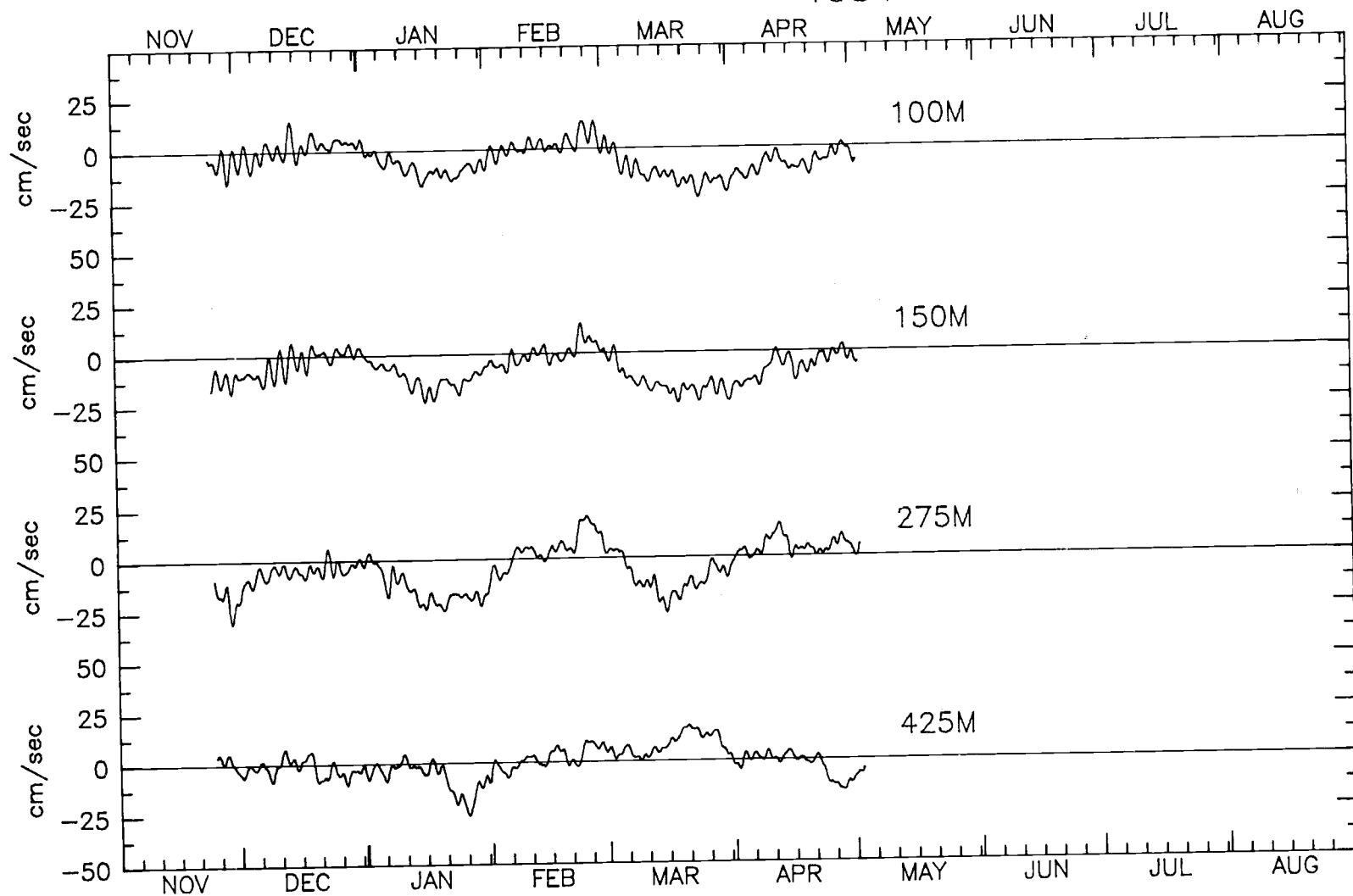
10 South Inner Slope Period V

U



10 South Inner Slope Period V

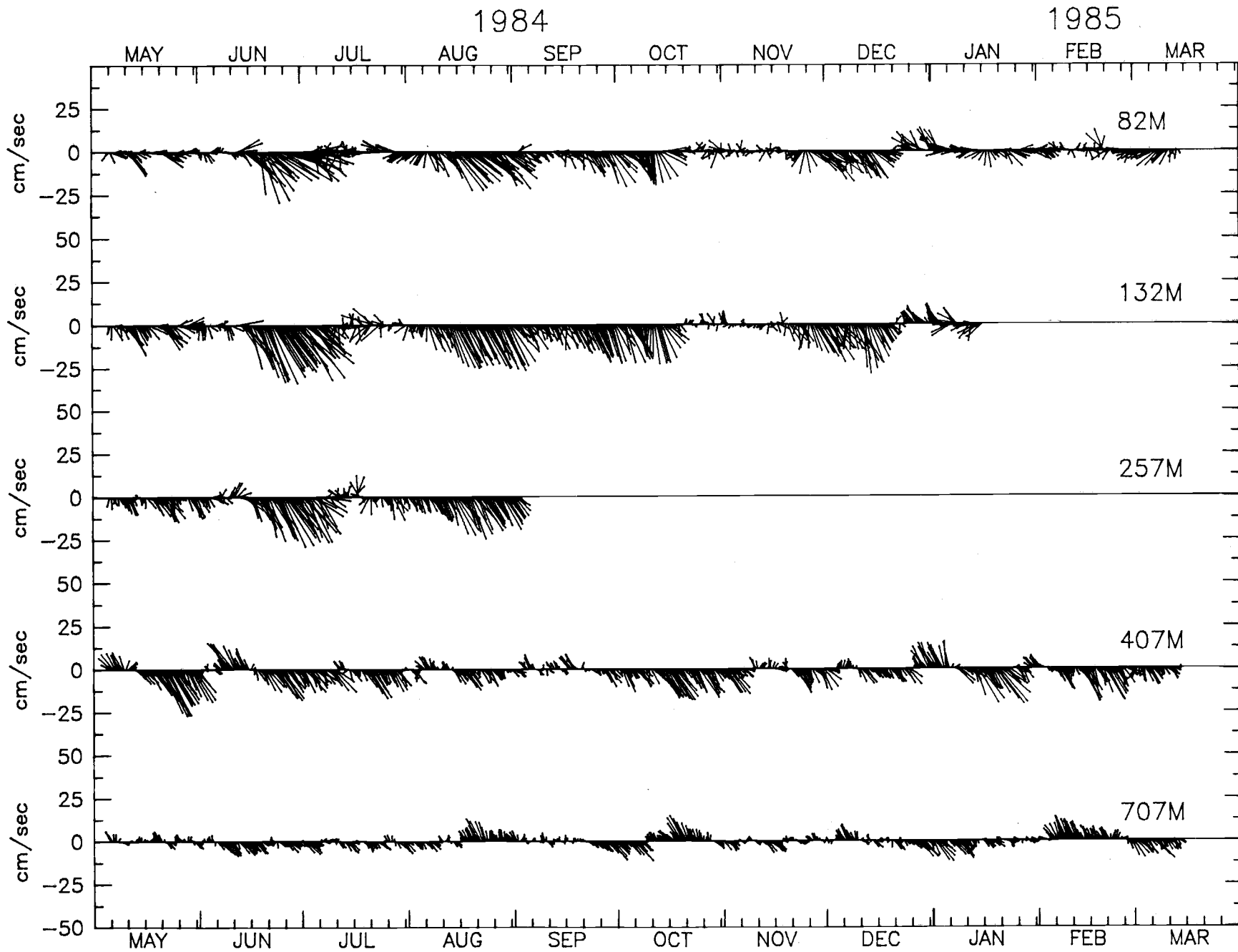
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V

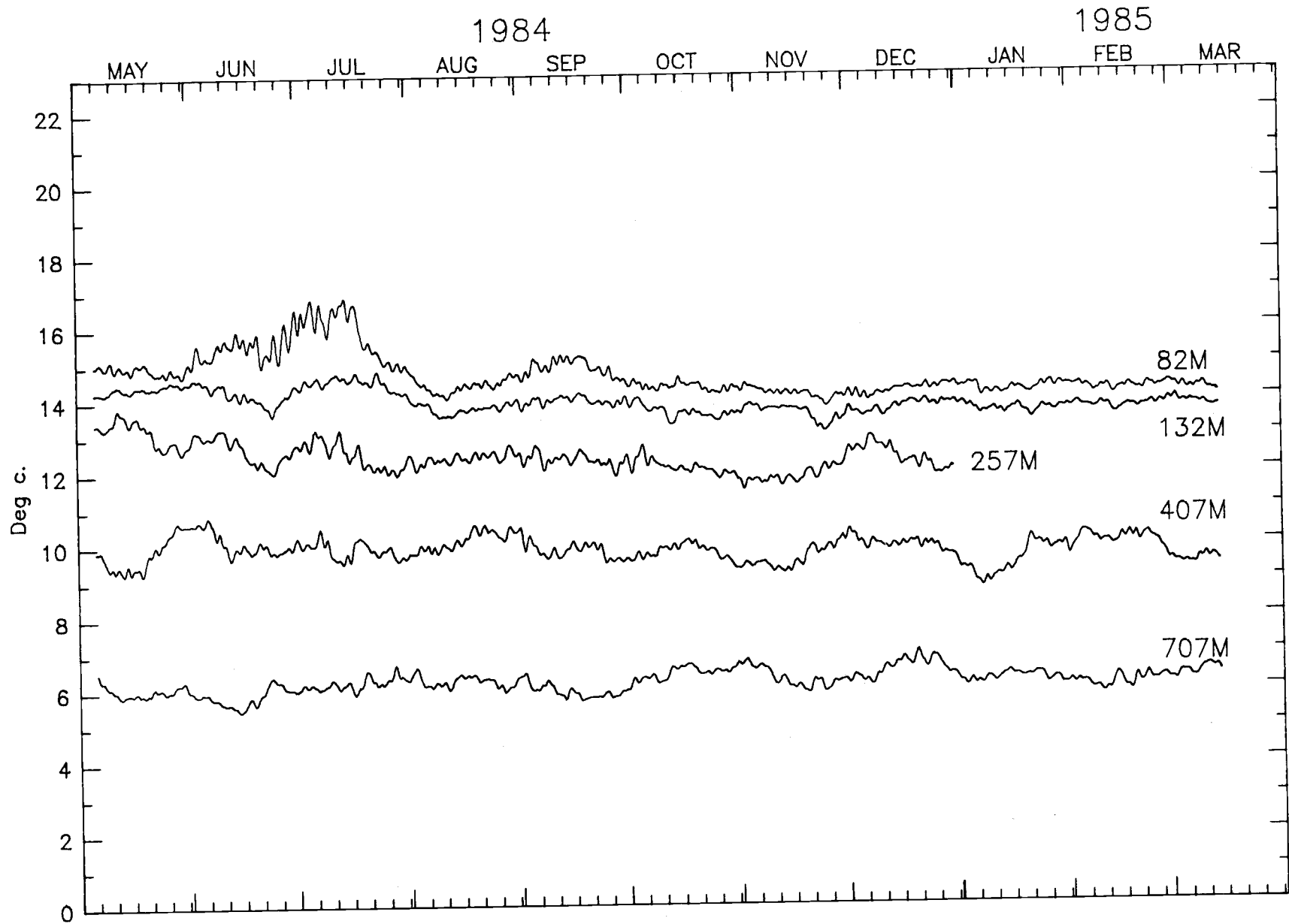
10 South Inner Slope Period V

→
V



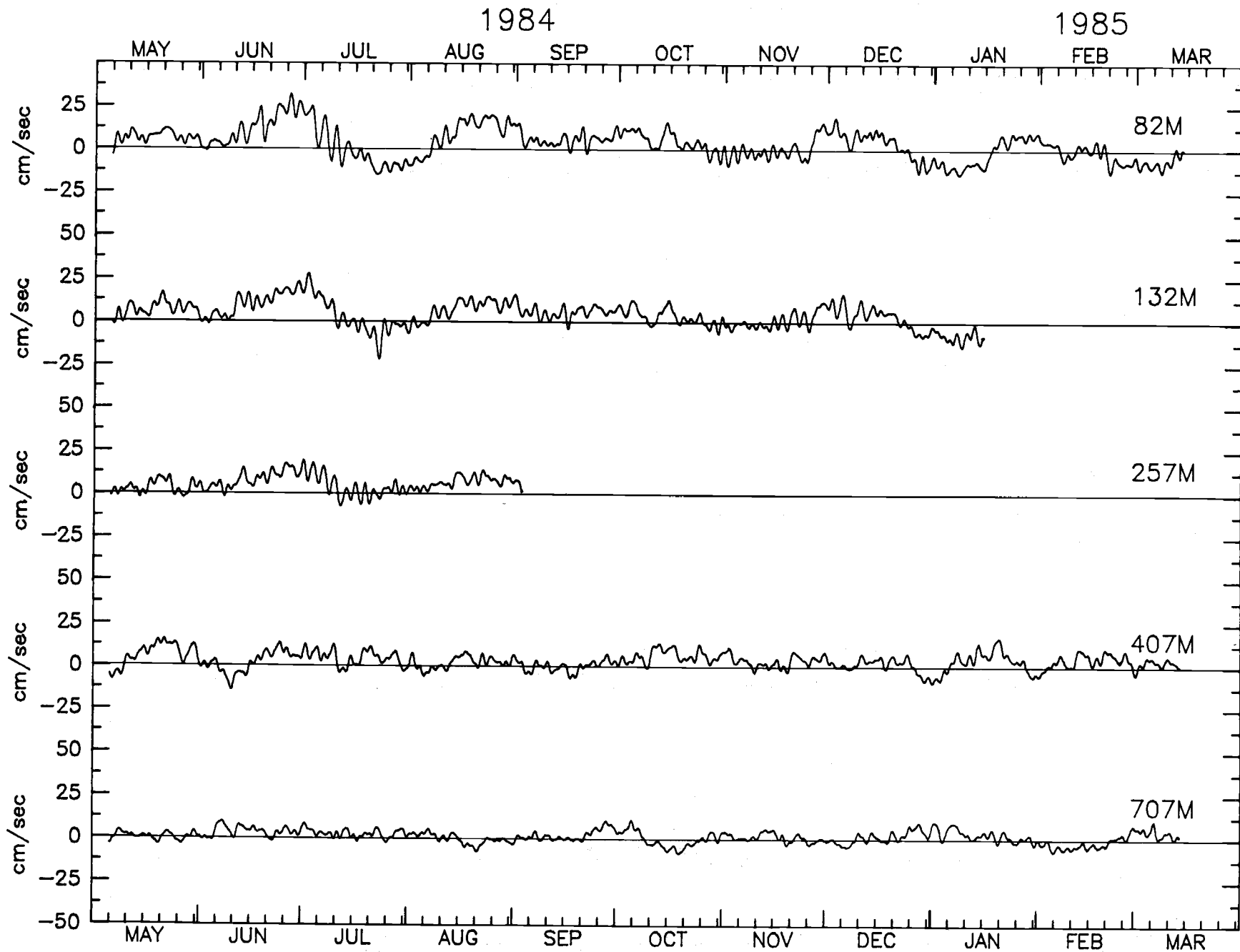
10 South Inner Slope Period VI

T



10 South Inner Slope Period VI

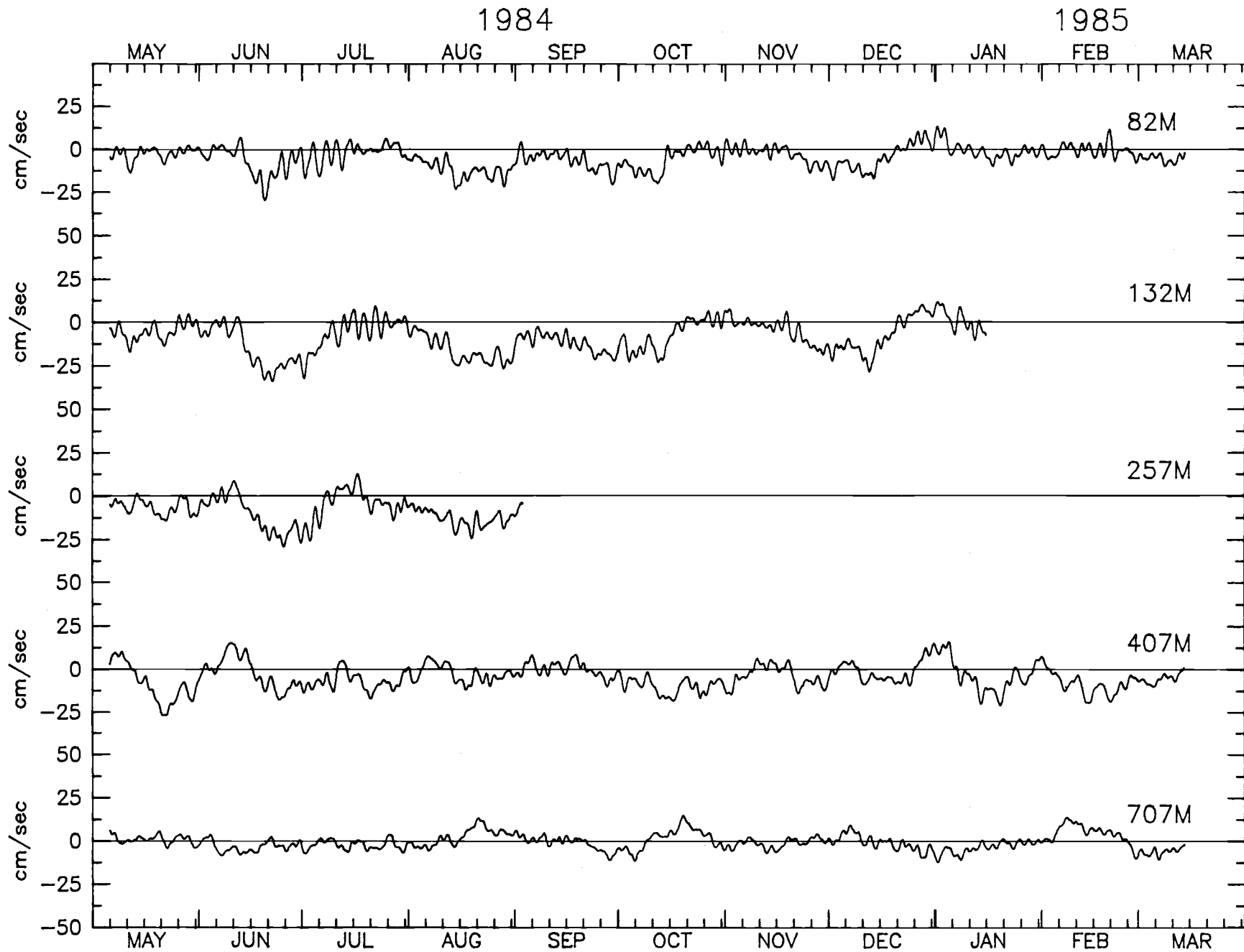
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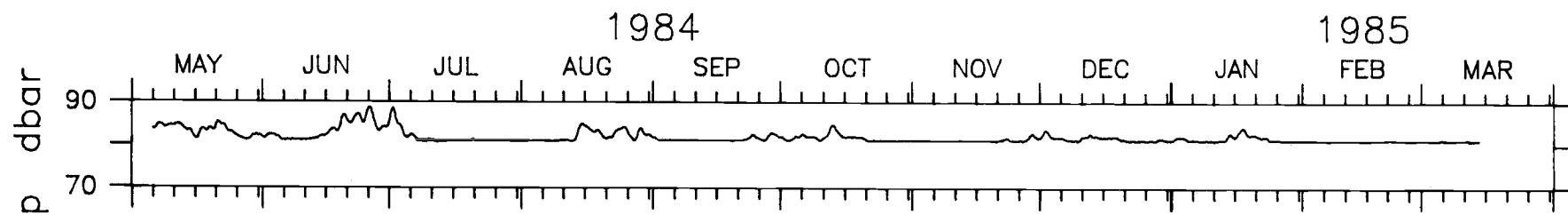
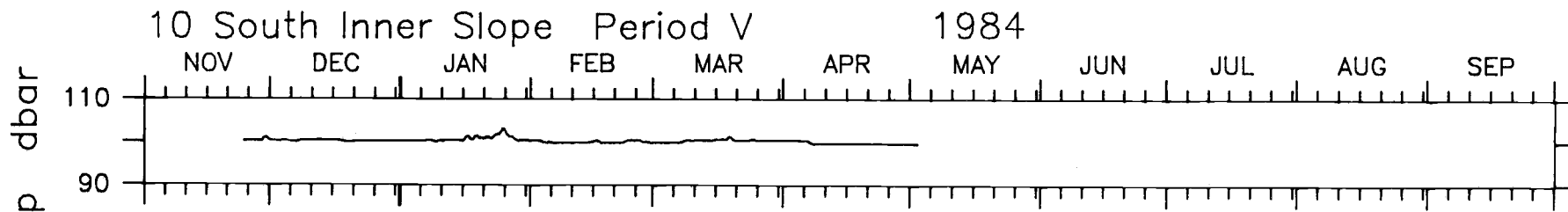
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10 South Inner Slope Period VI

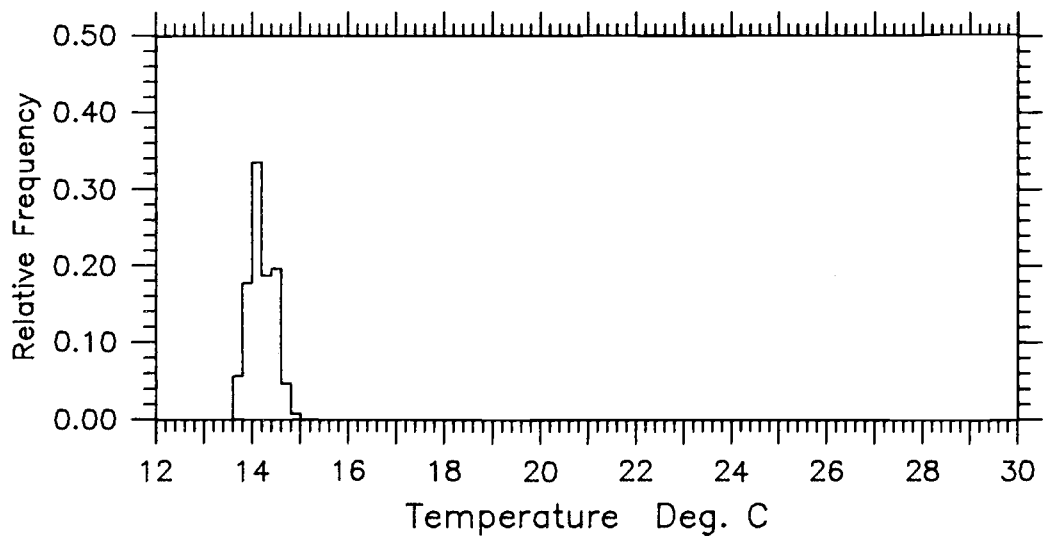
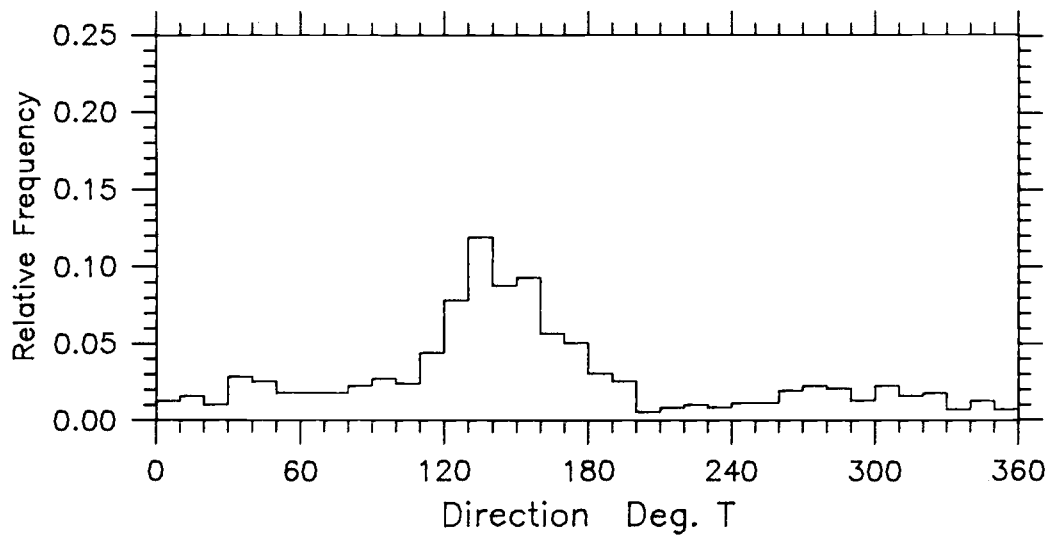
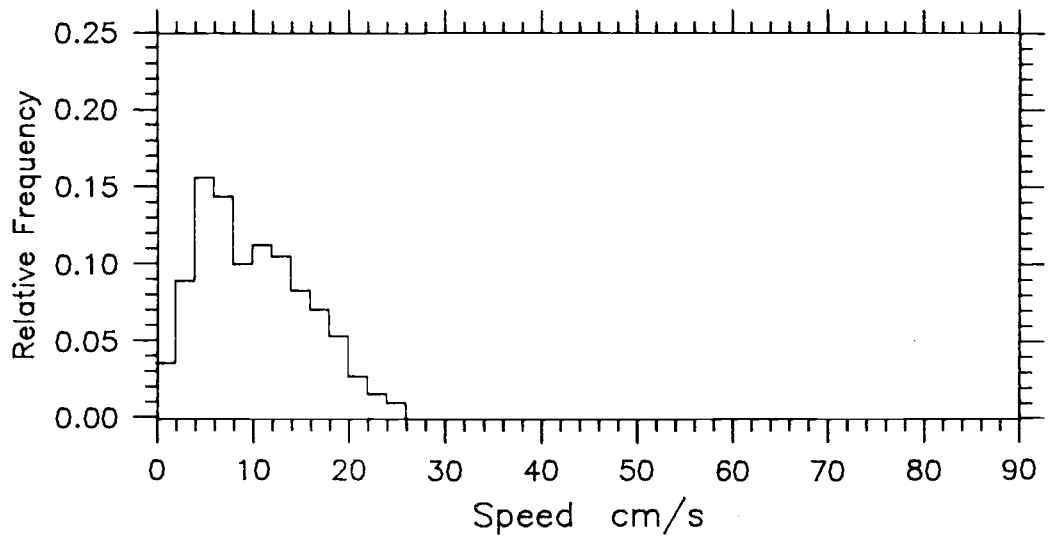
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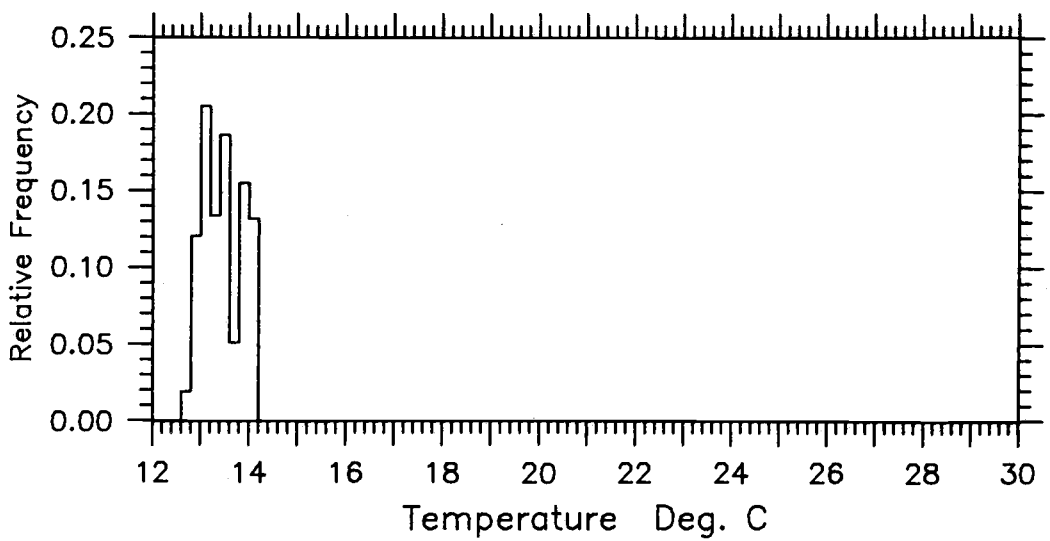
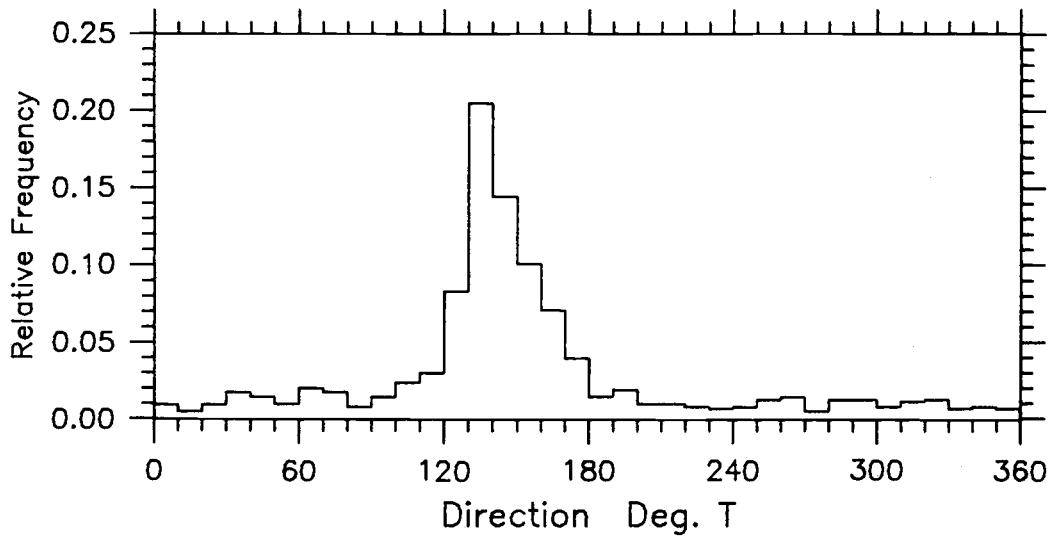
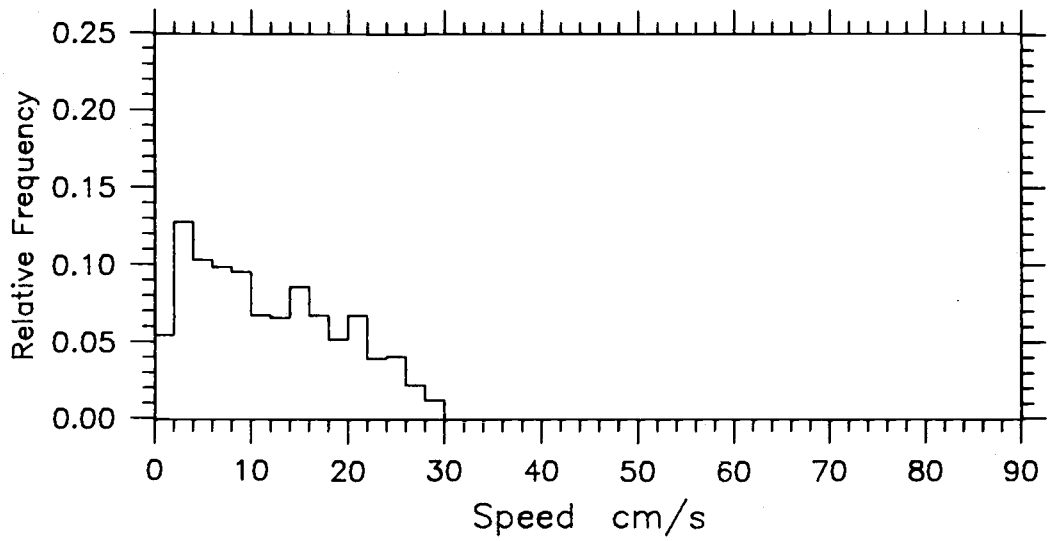
10 South Inner Slope Period VI



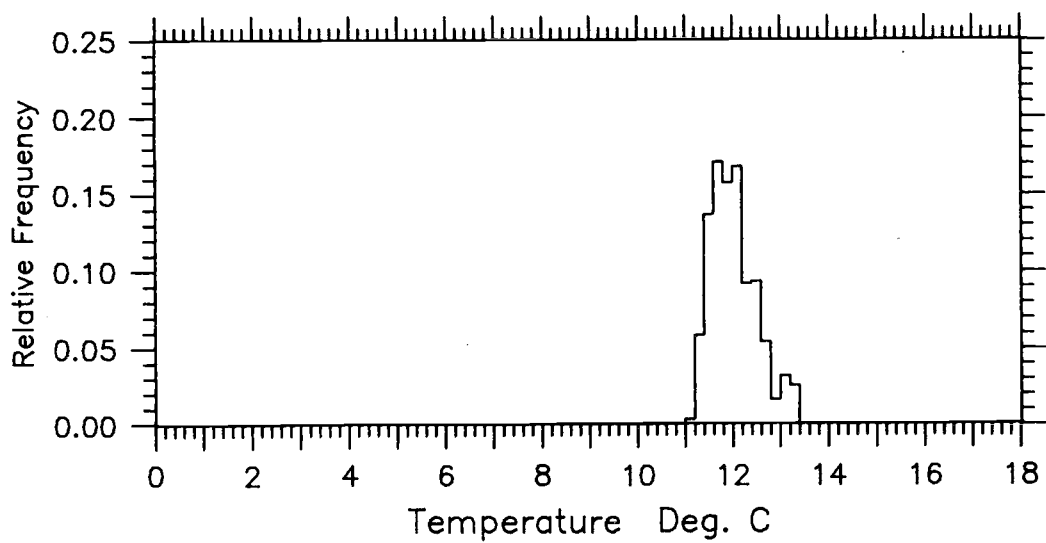
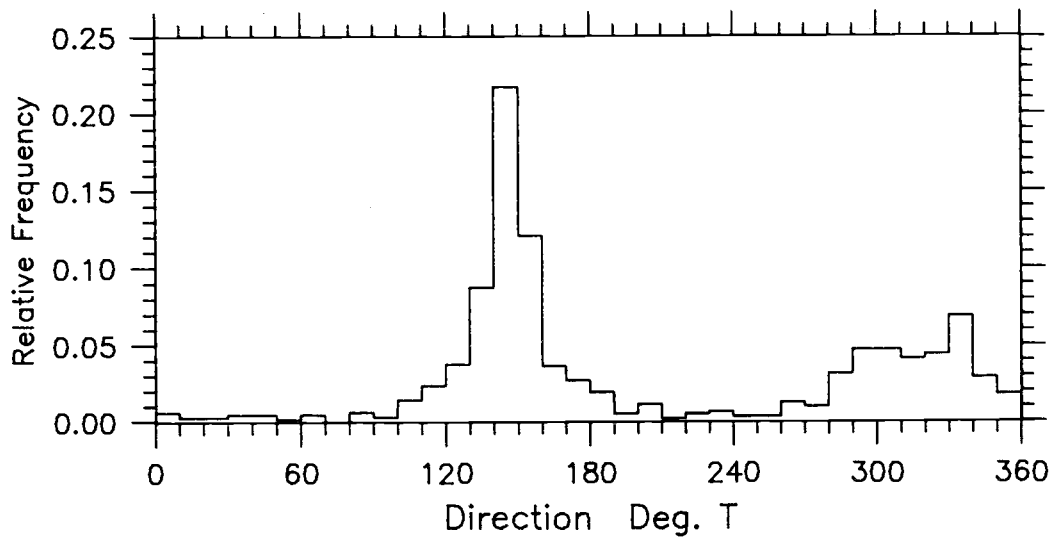
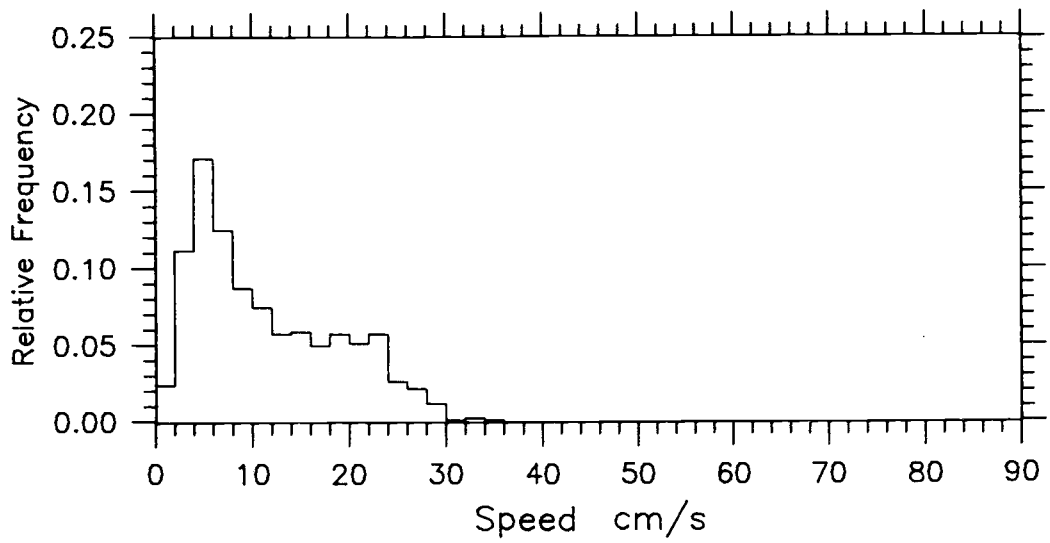
10 South Inner Slope Period VI



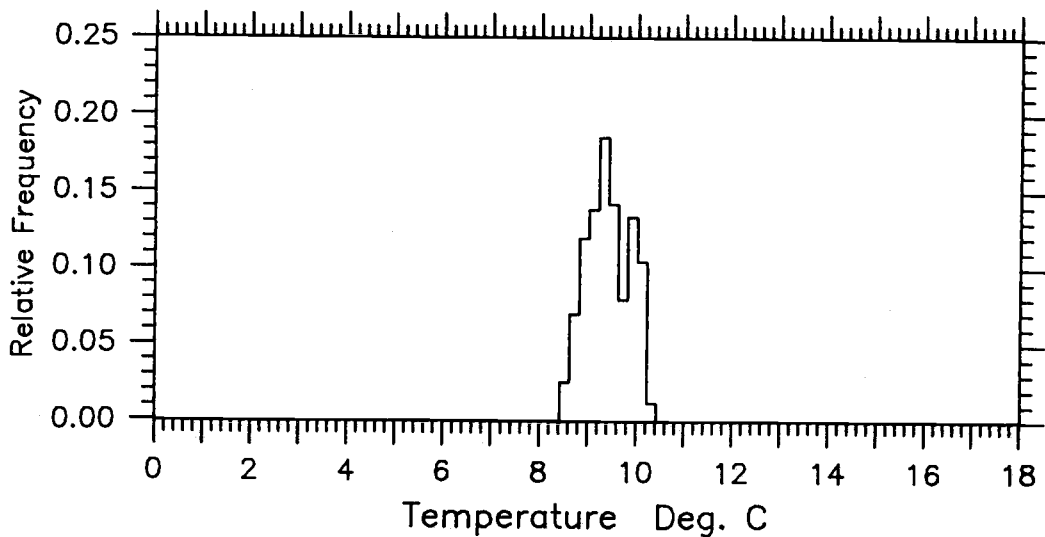
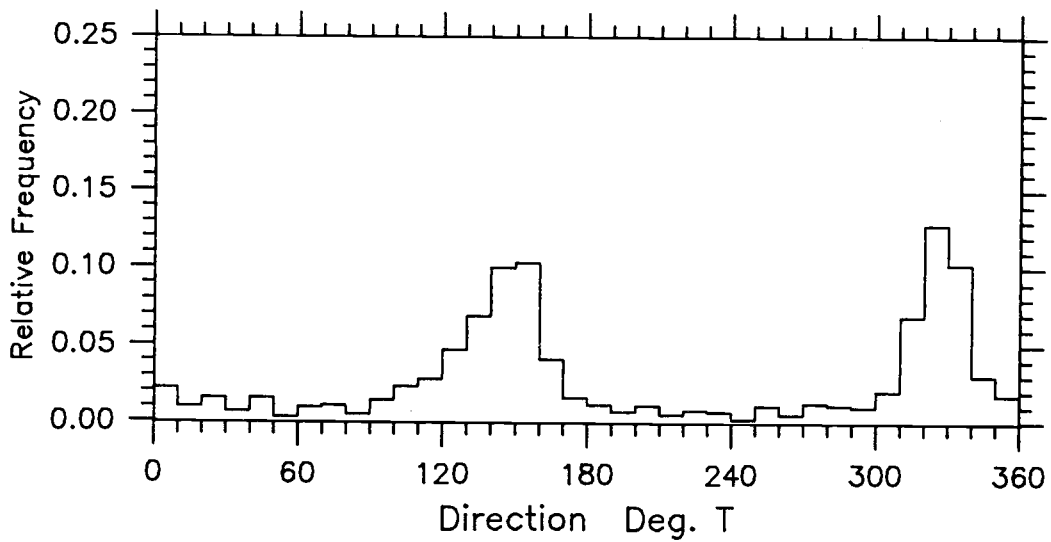
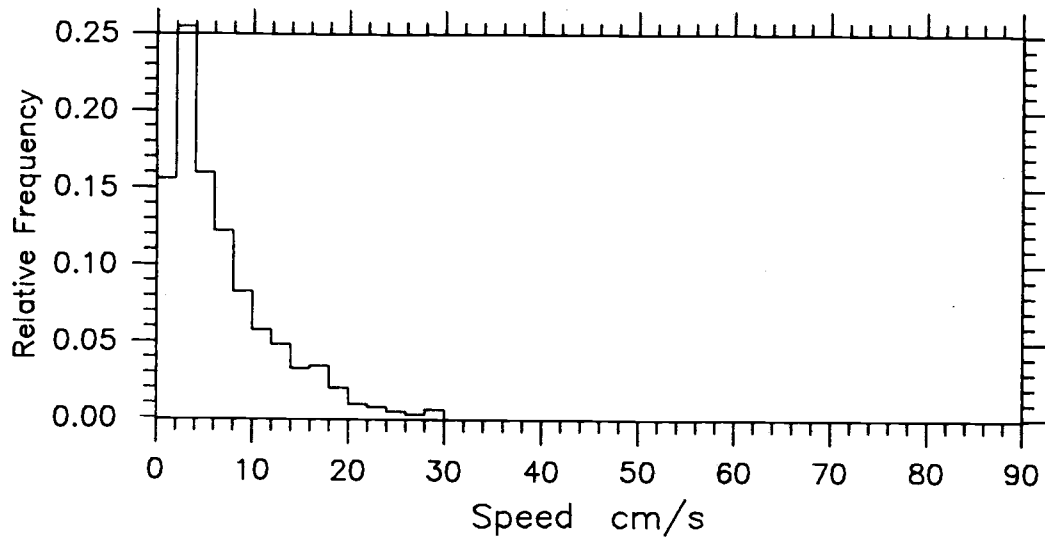
10 South Inner Slope Period V 100m



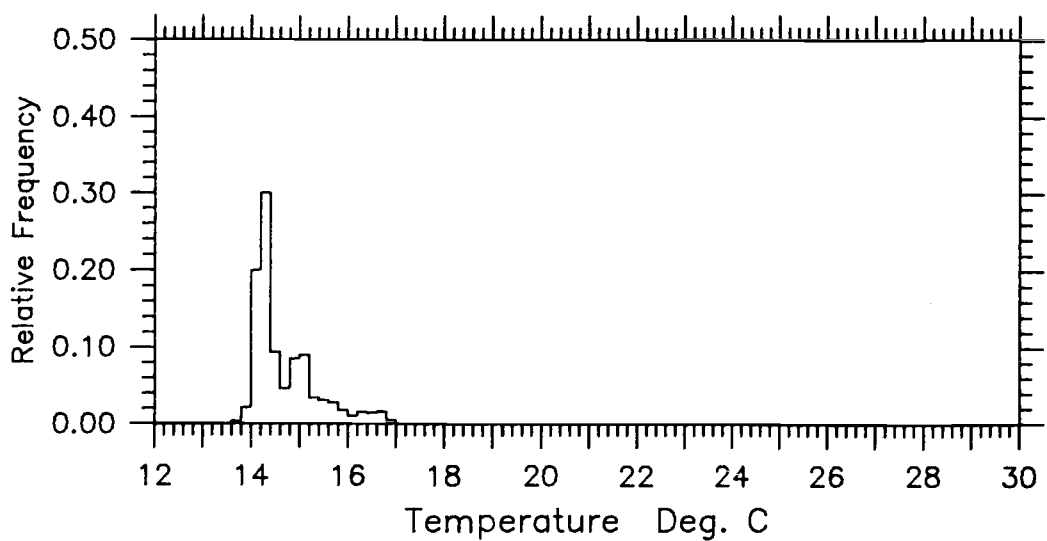
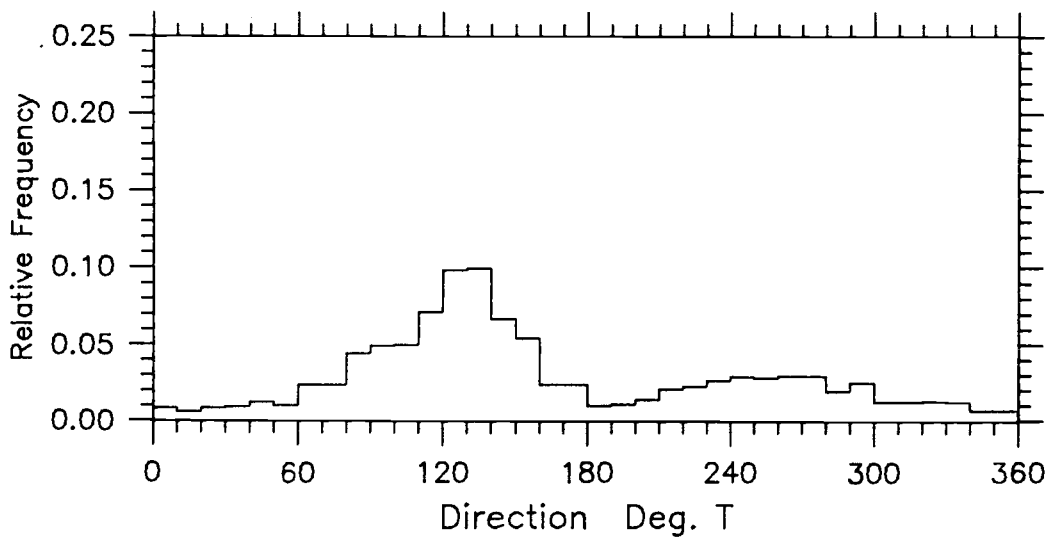
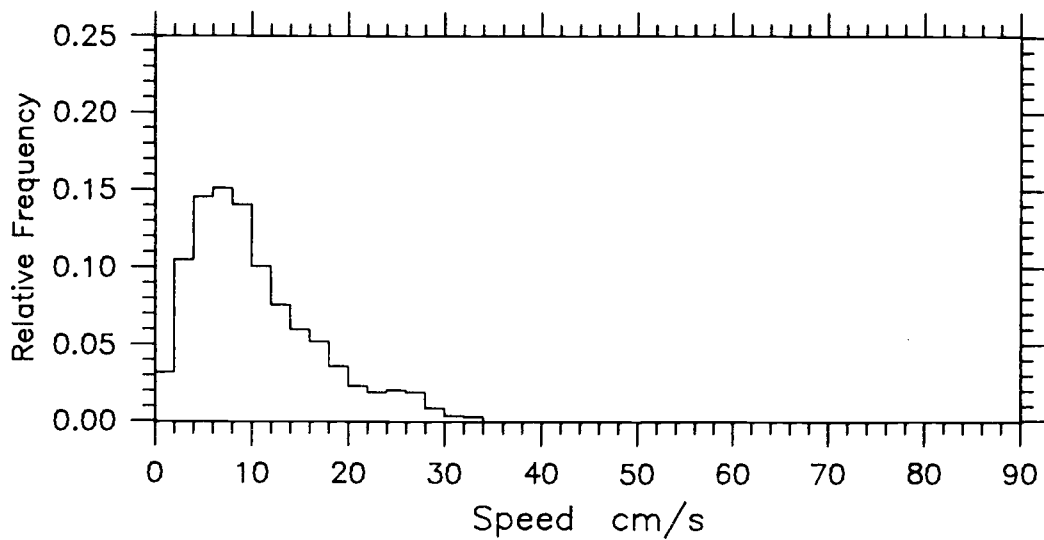
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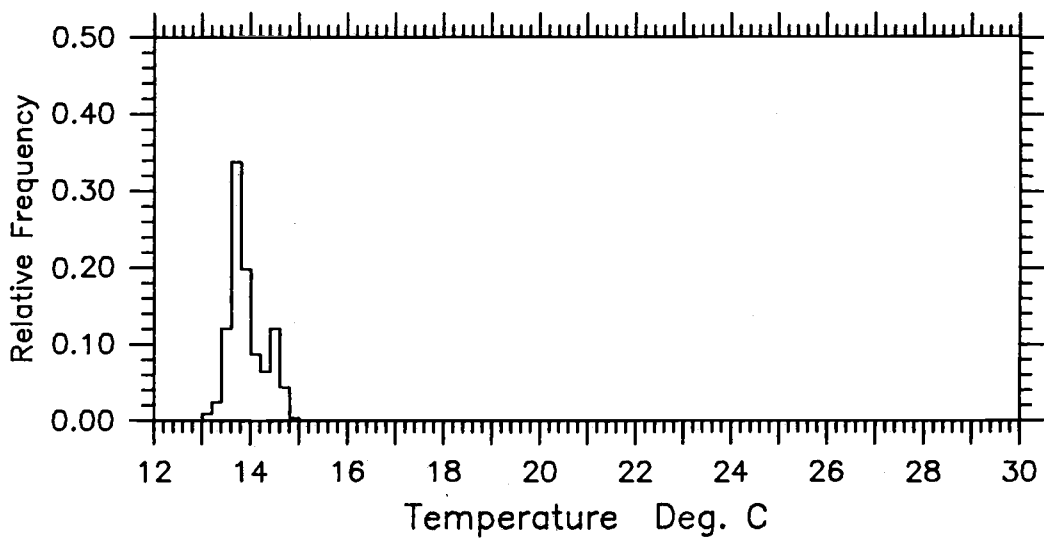
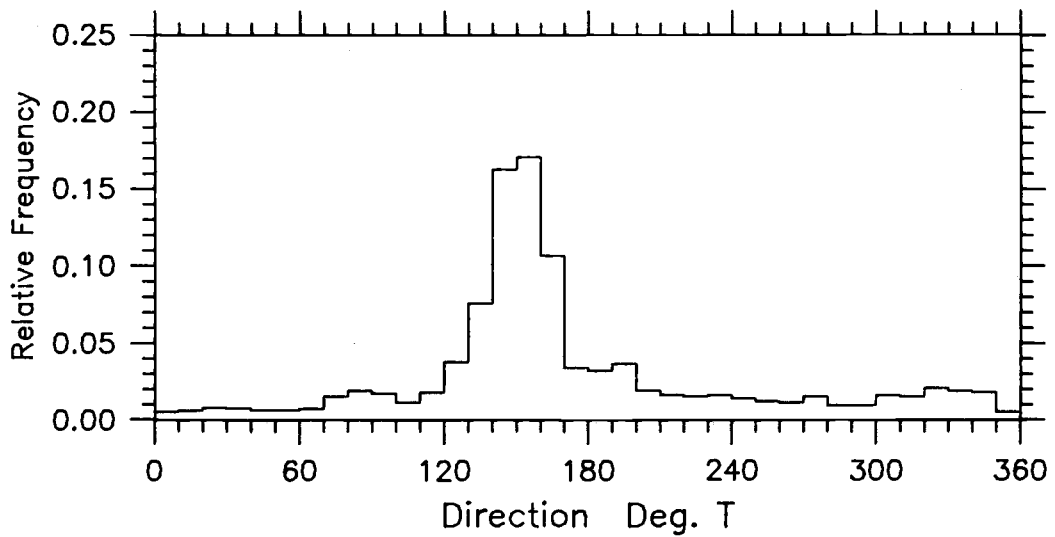
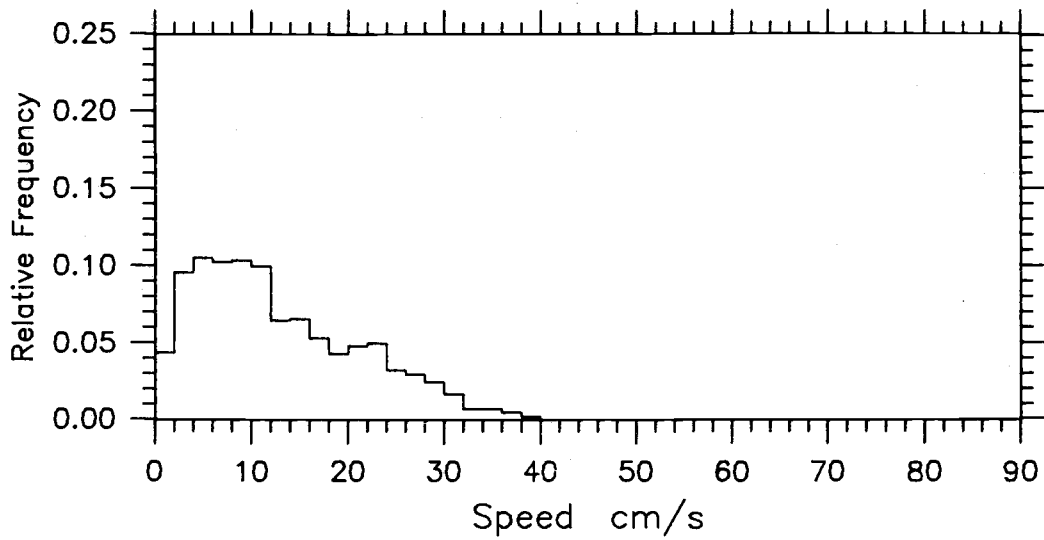
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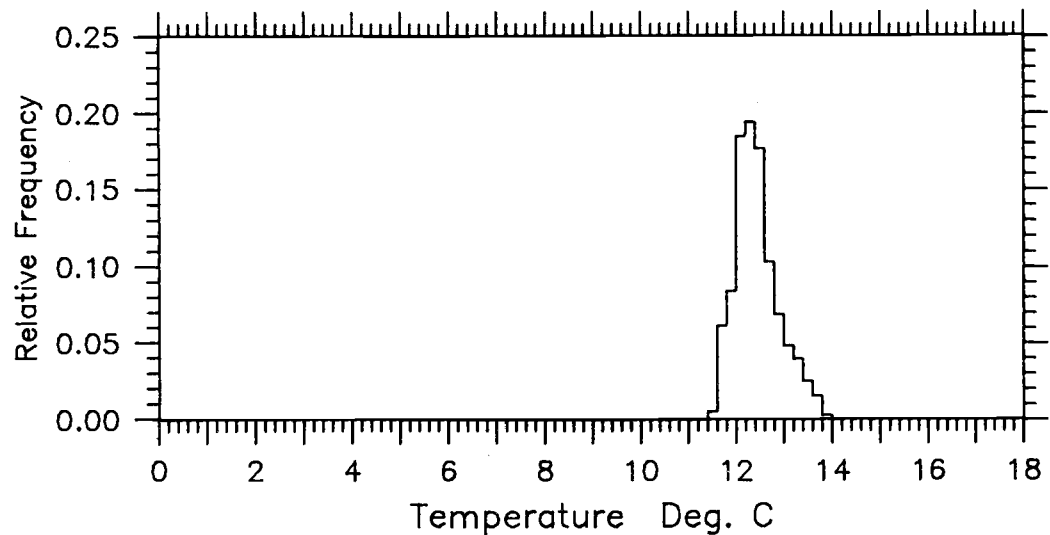
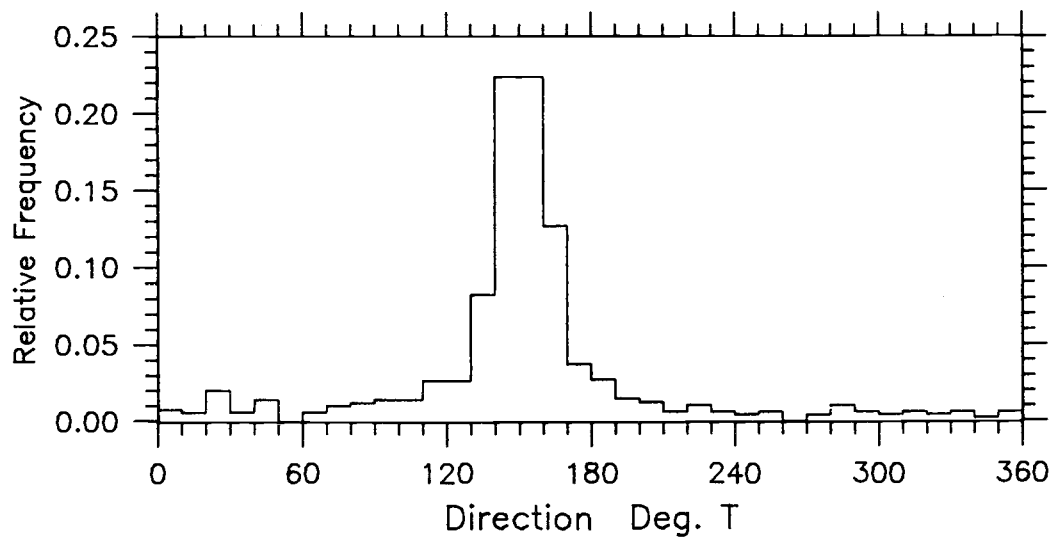
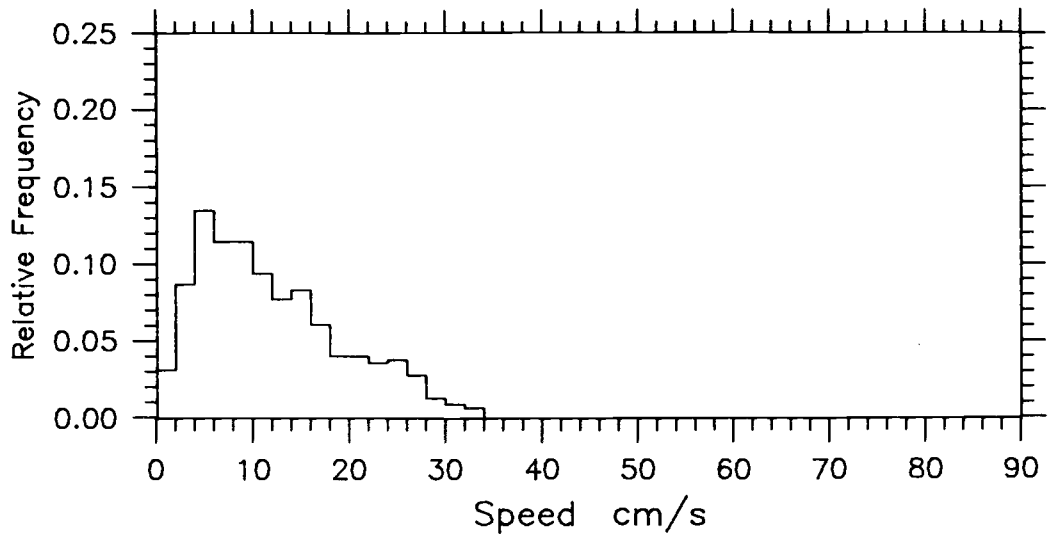
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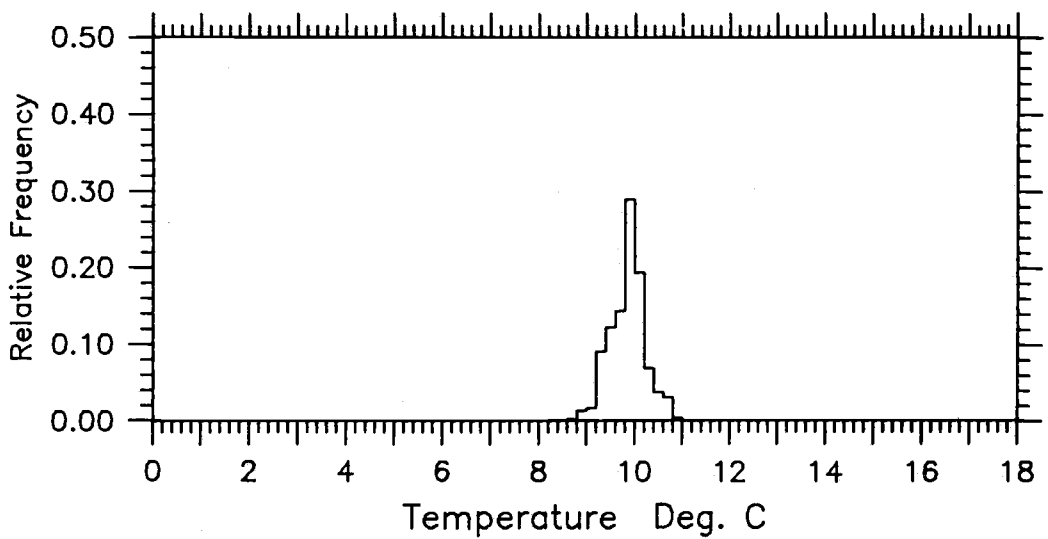
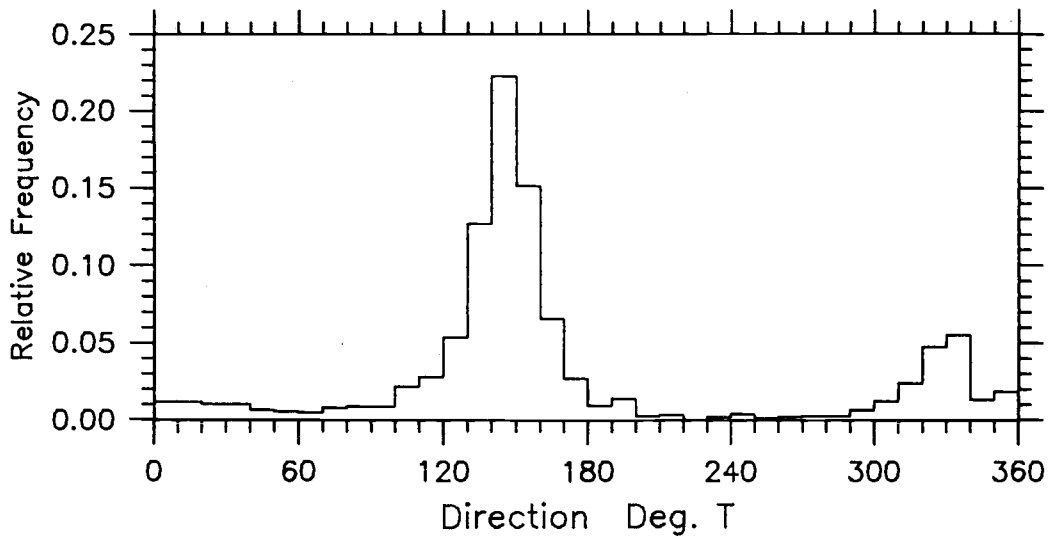
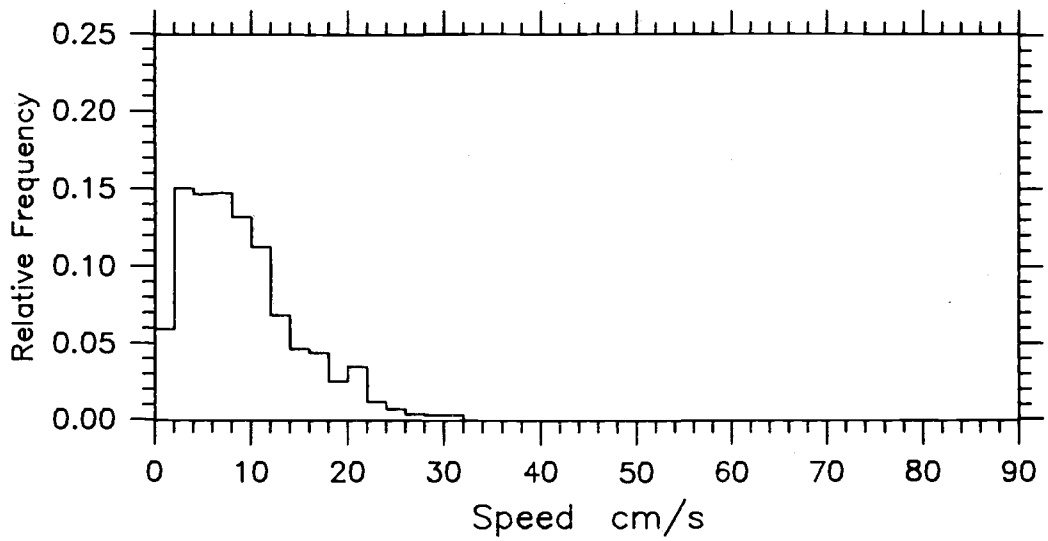
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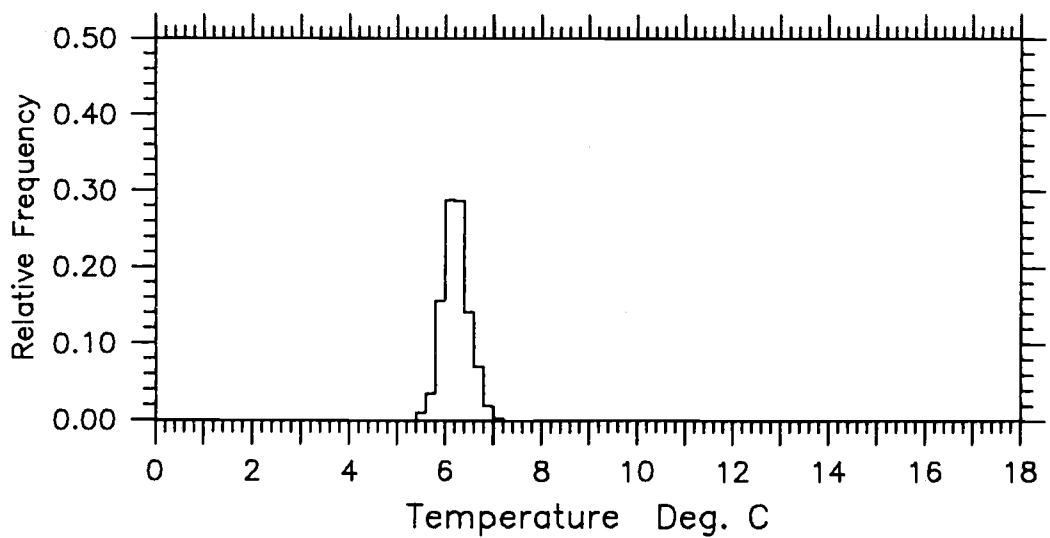
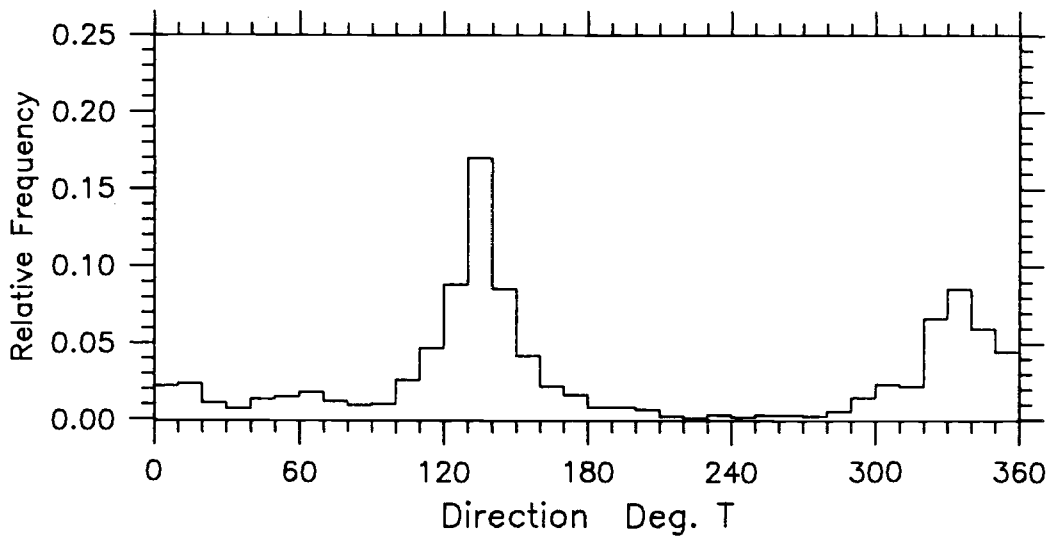
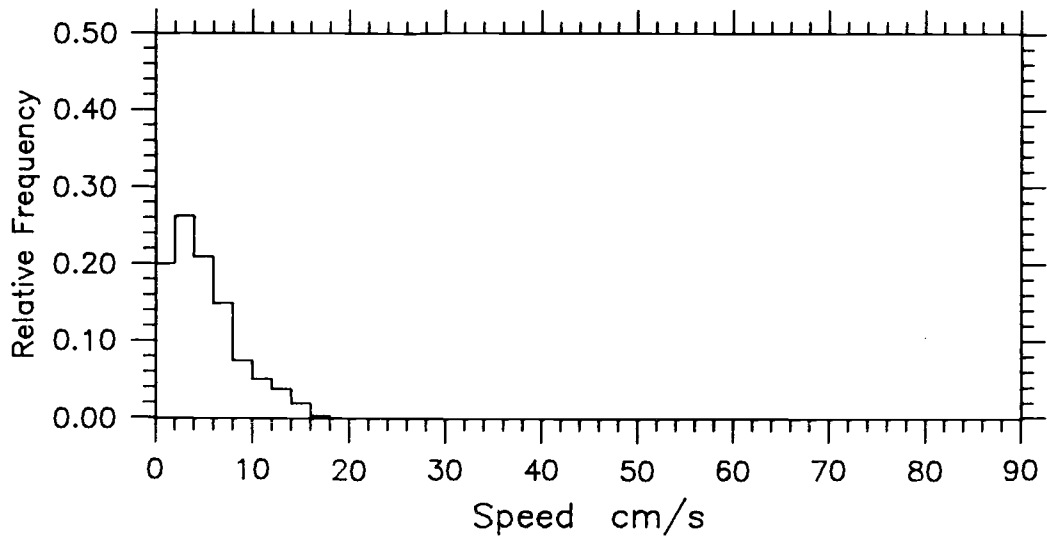
10 South Inner Slope Period VI 132m



10 South Inner Slope Period VI 257m



10 South Inner Slope Period VI 407m

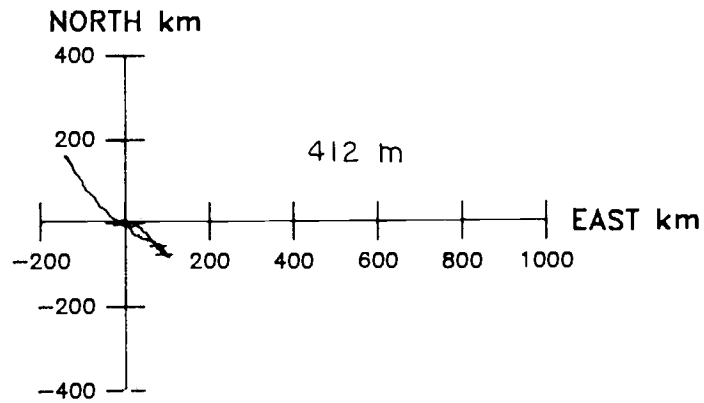
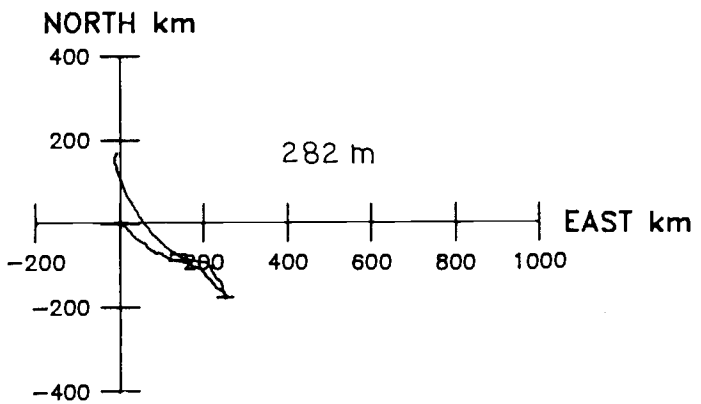
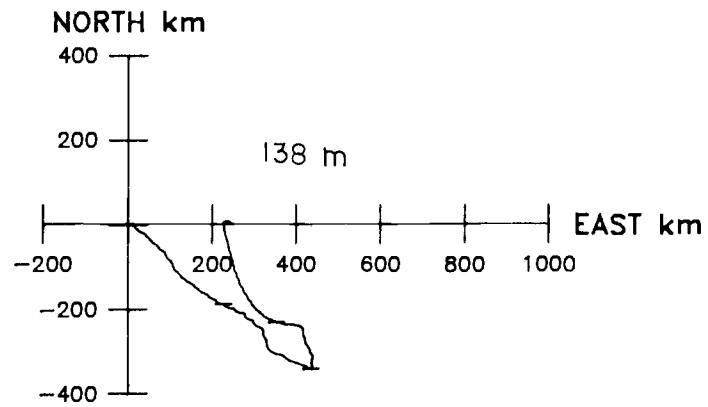
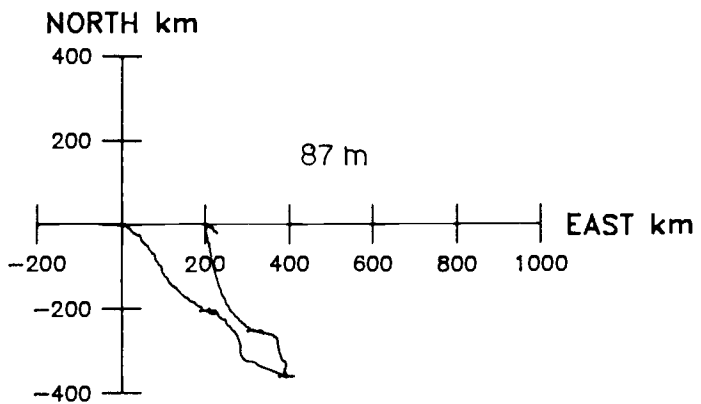


10 South Inner Slope Period VI 707m

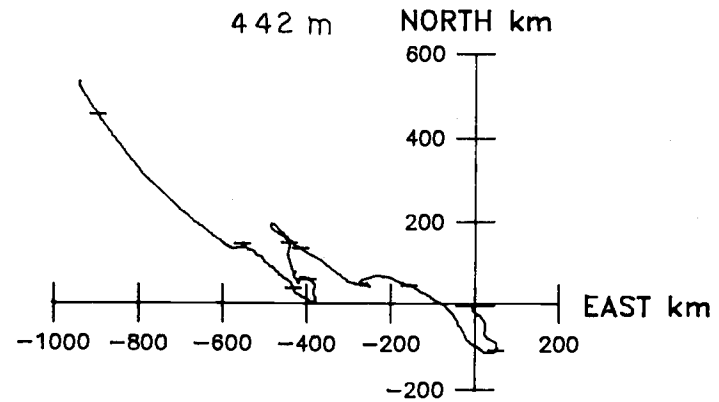
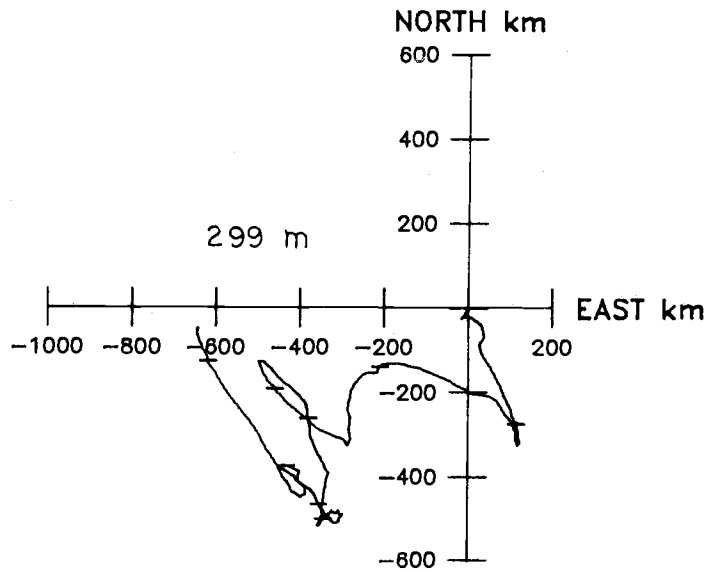
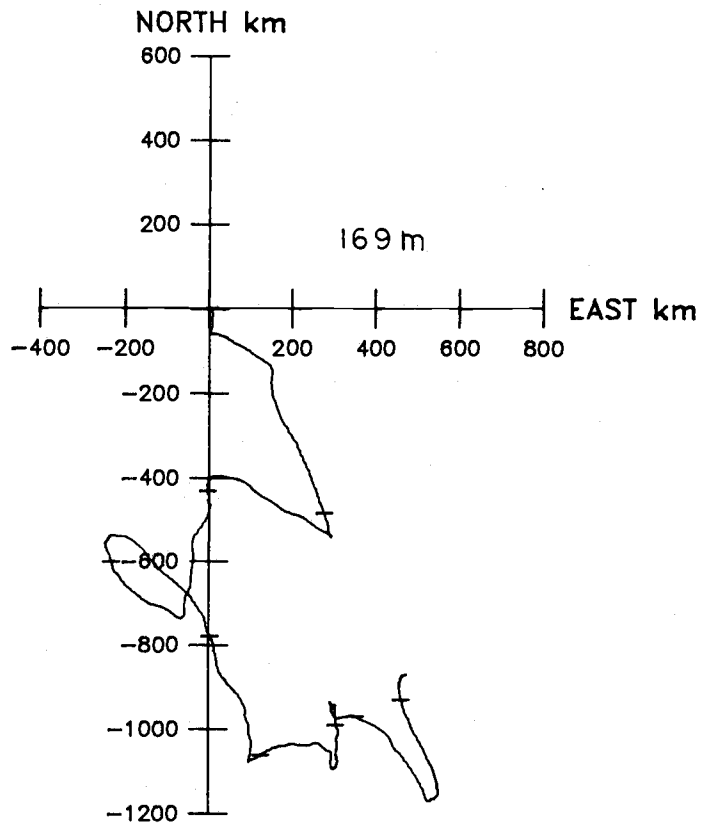
MOORING 10 SOUTH OUTER SLOPE

MOORING 10 South Outer Slope

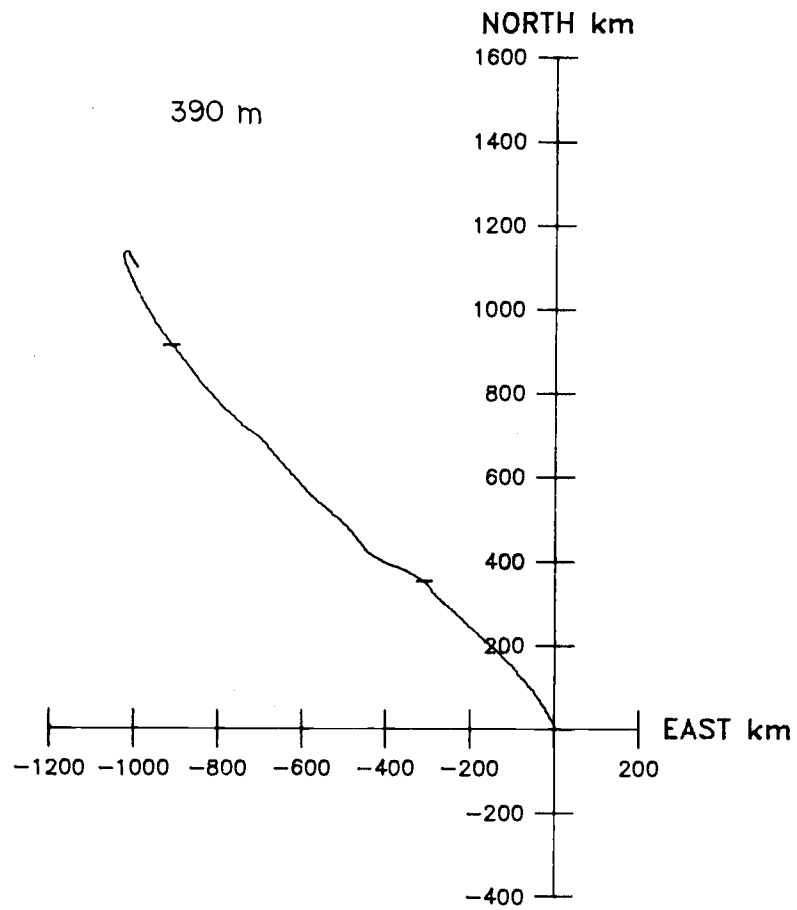
PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
I	87	451	451	2.3 (7.4)	-0.2 (10.6)	14.30 (0.16)	13.83	14.83	2.3	95.1	-31.2
	138	449	449	2.6 (8.0)	0.0 (10.0)	13.71 (0.21)	13.13	13.96	2.6	89.8	-36.7
	282	449	449	-0.1 (7.0)	1.7 (7.8)	12.37 (0.37)	11.52	12.93	1.7	357.4	-41.2
	412	449	449	-1.5 (5.3)	1.6 (5.8)	9.85 (0.40)	8.97	10.67	2.2	317.7	-41.5
II	169	989	989	2.2 (11.1)	-4.1 (14.1)	13.87 (0.57)	12.56	15.45	4.6	151.4	-31.1
	299	989	989	-3.0 (9.0)	-0.2 (11.7)	12.27 (0.69)	10.64	14.05	3.0	265.9	-33.7
	442	989	989	-4.4 (7.5)	2.5 (7.6)	9.42 (0.71)	8.27	11.56	5.1	299.6	-44.5
III	390	333	333	-13.8 (10.5)	15.2 (9.7)	10.57 (1.17)	8.06	12.23	20.6	317.8	-47.6
IV	90	1123	1123	4.0 (7.6)	3.0 (10.7)	20.35 (2.14)	15.13	24.04	5.1	53.2	-18.1
	140	1123	1123	4.2 (7.3)	-0.9 (9.5)	15.43 (1.54)	12.96	19.69	4.3	101.6	-30.0
	265	778	1123	2.7 (4.5)	-1.4 (6.0)	11.96 (0.60)	10.81	13.33	3.0	117.1	-33.3
	415	949	946	1.6 (4.8)	-0.8 (5.9)	9.19 (0.66)	8.18	10.72	1.8	114.8	-37.4
V	84	627	627	1.6 (5.8)	-2.0 (7.5)	15.51 (0.80)	14.69	18.02	2.5	141.1	-26.7
	134	627	627	5.7 (5.7)	-5.0 (7.8)	13.89 (0.29)	13.27	14.58	7.6	131.0	-29.3
	279	627	627	4.4 (4.5)	-4.3 (5.9)	11.71 (0.37)	10.97	12.60	6.2	134.6	-33.1
VI	79	1230	1254	3.2 (8.6)	-2.7 (7.3)	15.12 (0.91)	14.09	18.53	4.2	129.8	-56.4
	130	1254	1254	4.9 (9.5)	-4.6 (8.9)	13.92 (0.39)	13.24	15.14	6.8	133.4	-49.0
	250	1254	1254	2.7 (7.6)	-2.8 (7.4)	12.35 (0.41)	11.66	13.56	3.9	135.3	-46.5
	400	1254	1254	1.5 (5.4)	-1.6 (6.8)	9.82 (0.31)	8.95	10.87	2.1	136.4	-33.4



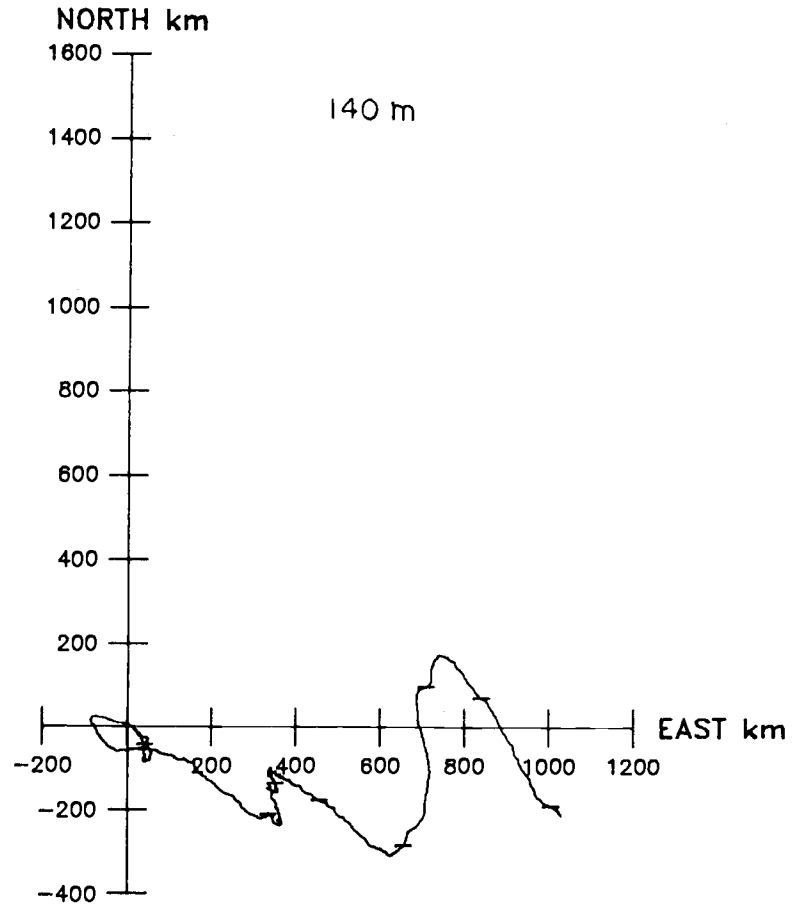
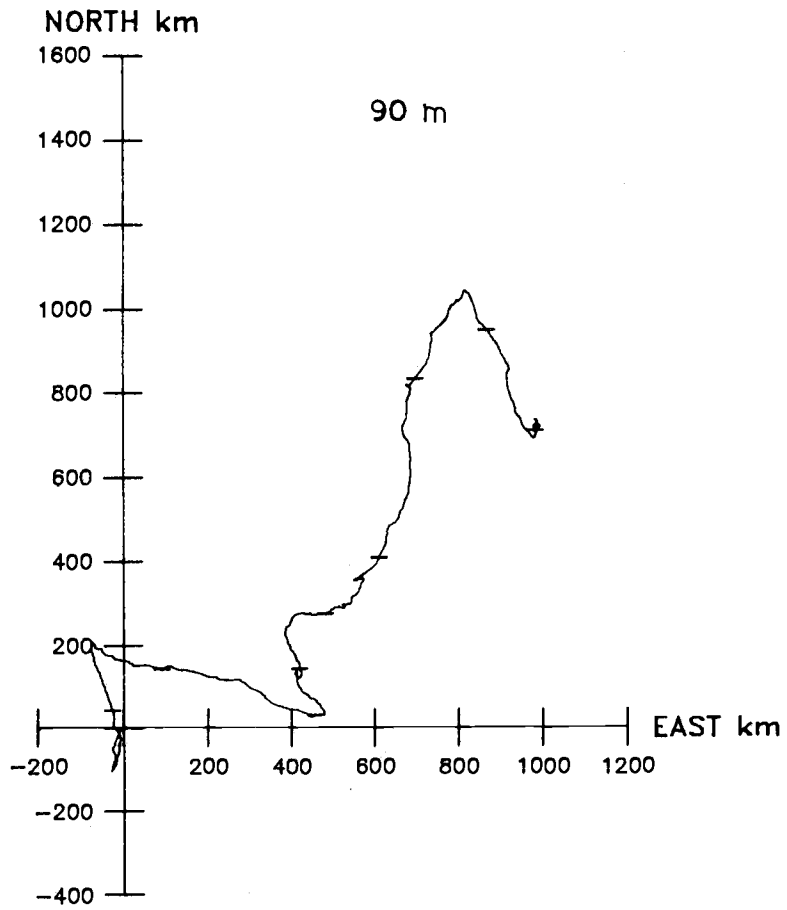
10 South Outer Slope Period I



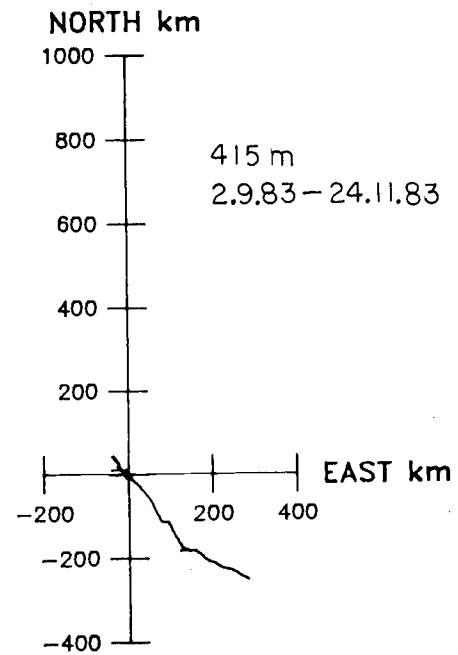
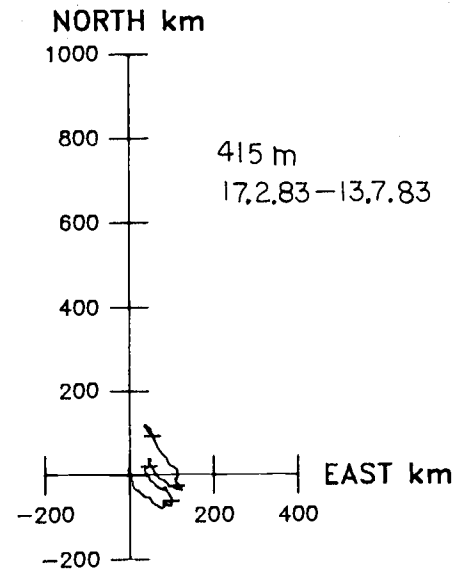
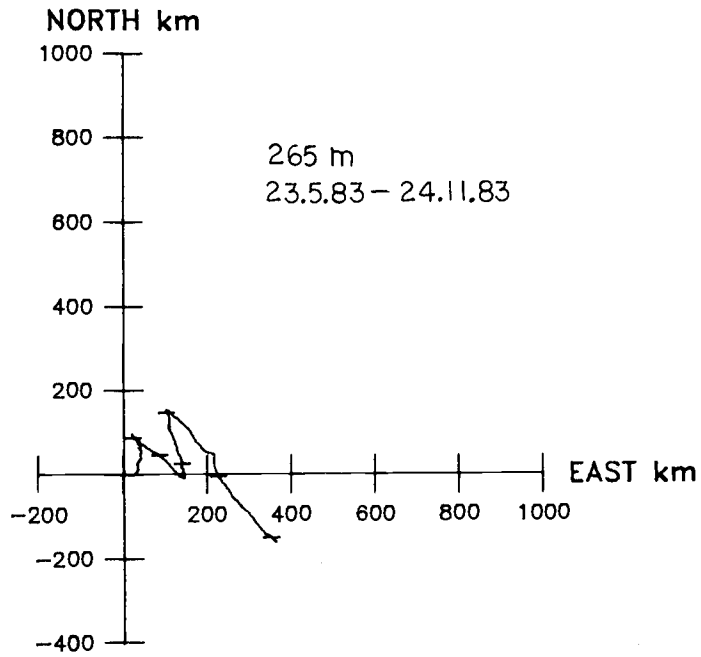
10 South Outer Slope Period II



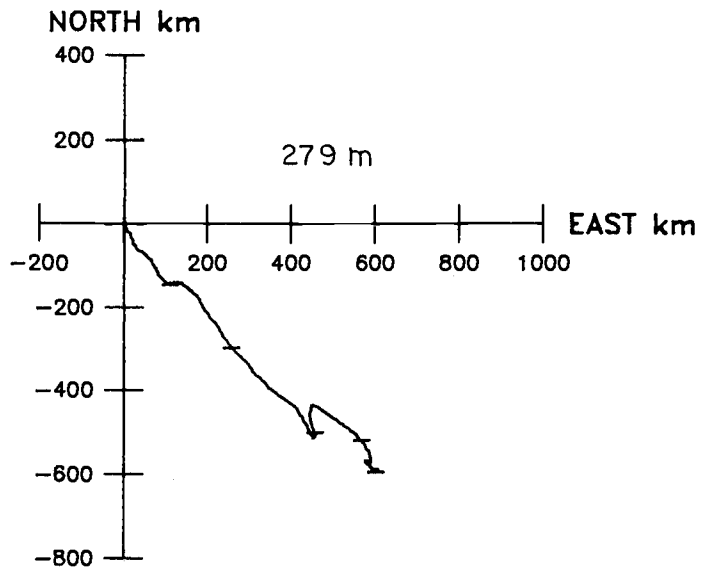
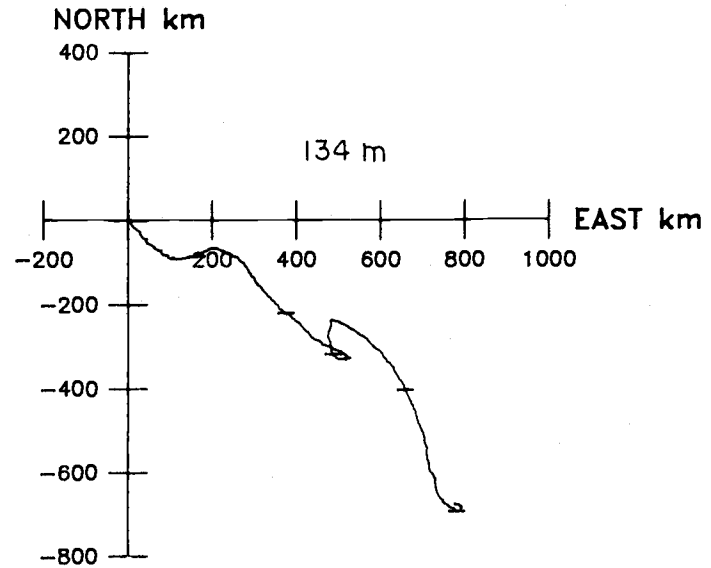
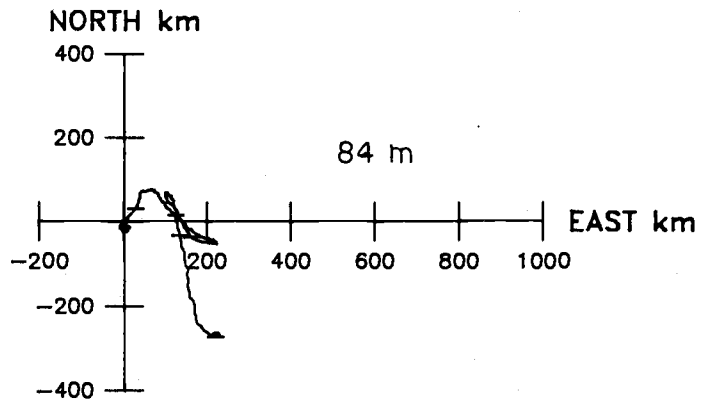
10 South Outer Slope Period III



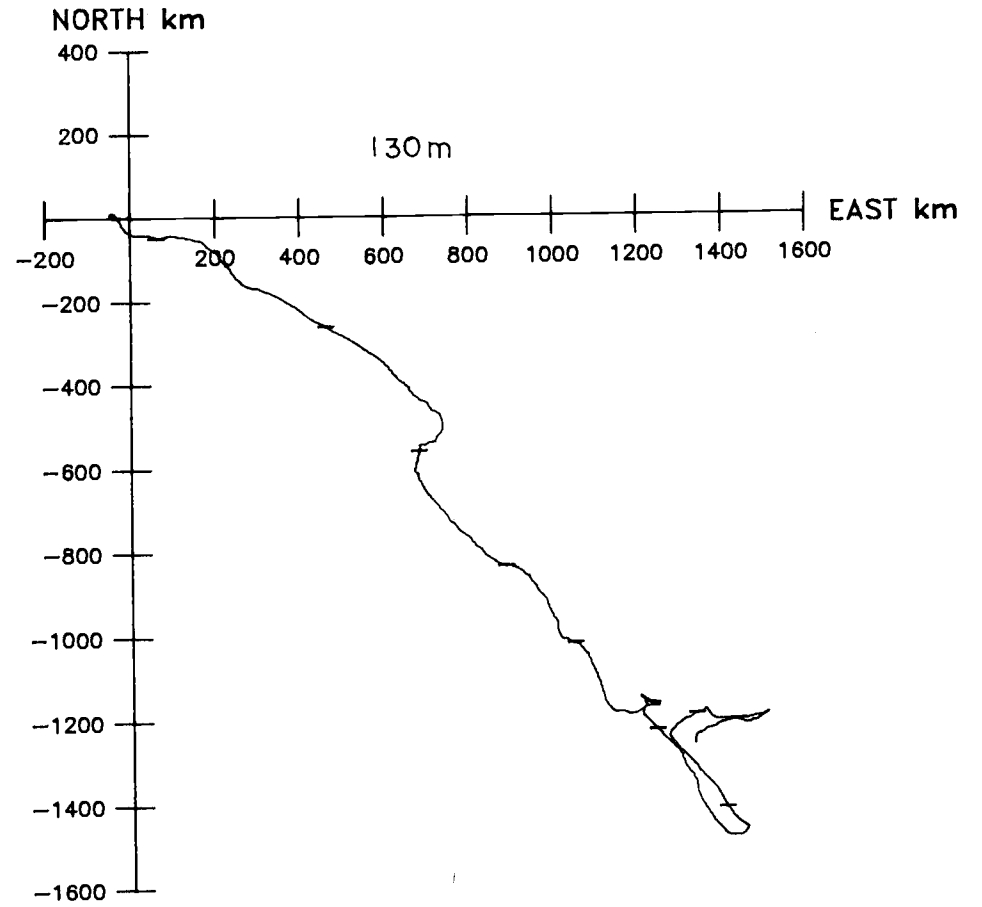
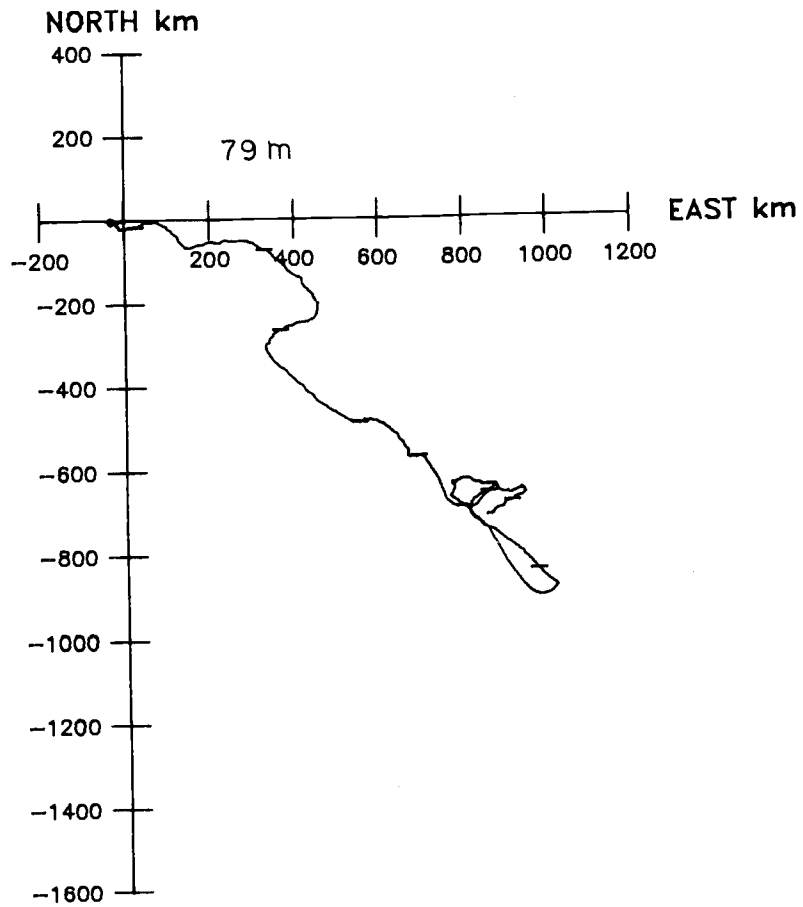
10 South Outer Slope Period IV



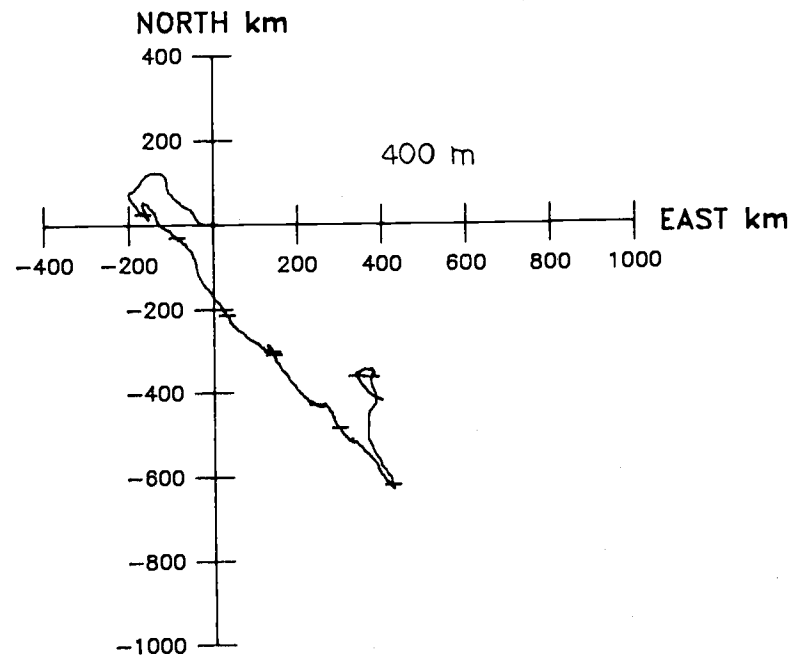
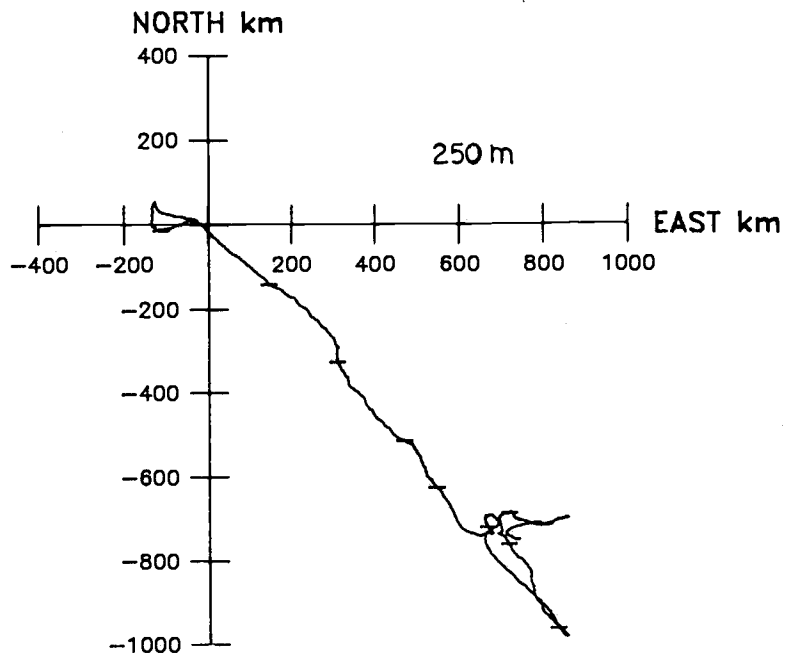
10 South Outer Slope Period IV



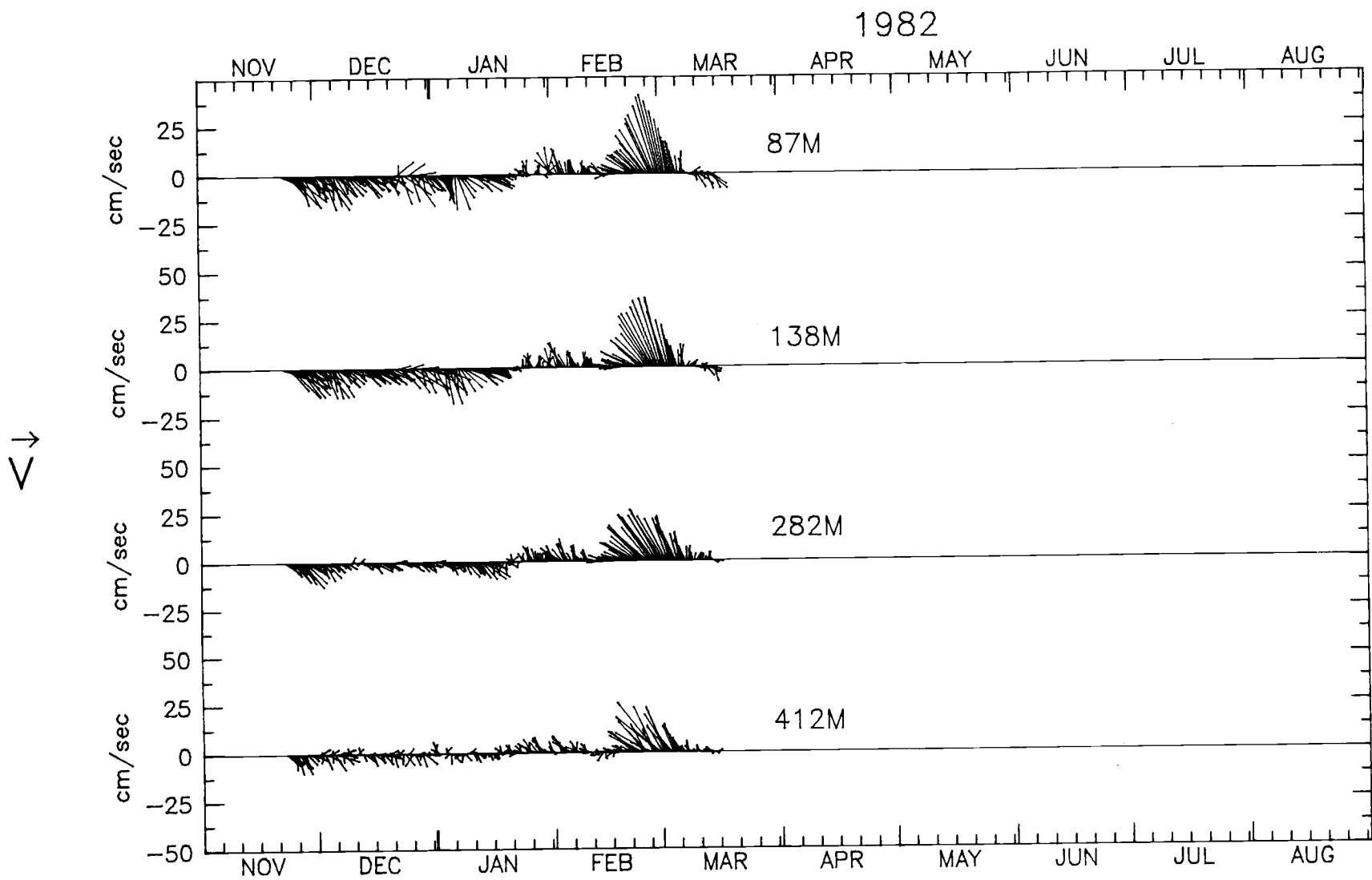
10 South Outer Slope Period V



10 South Outer Slope Period VI

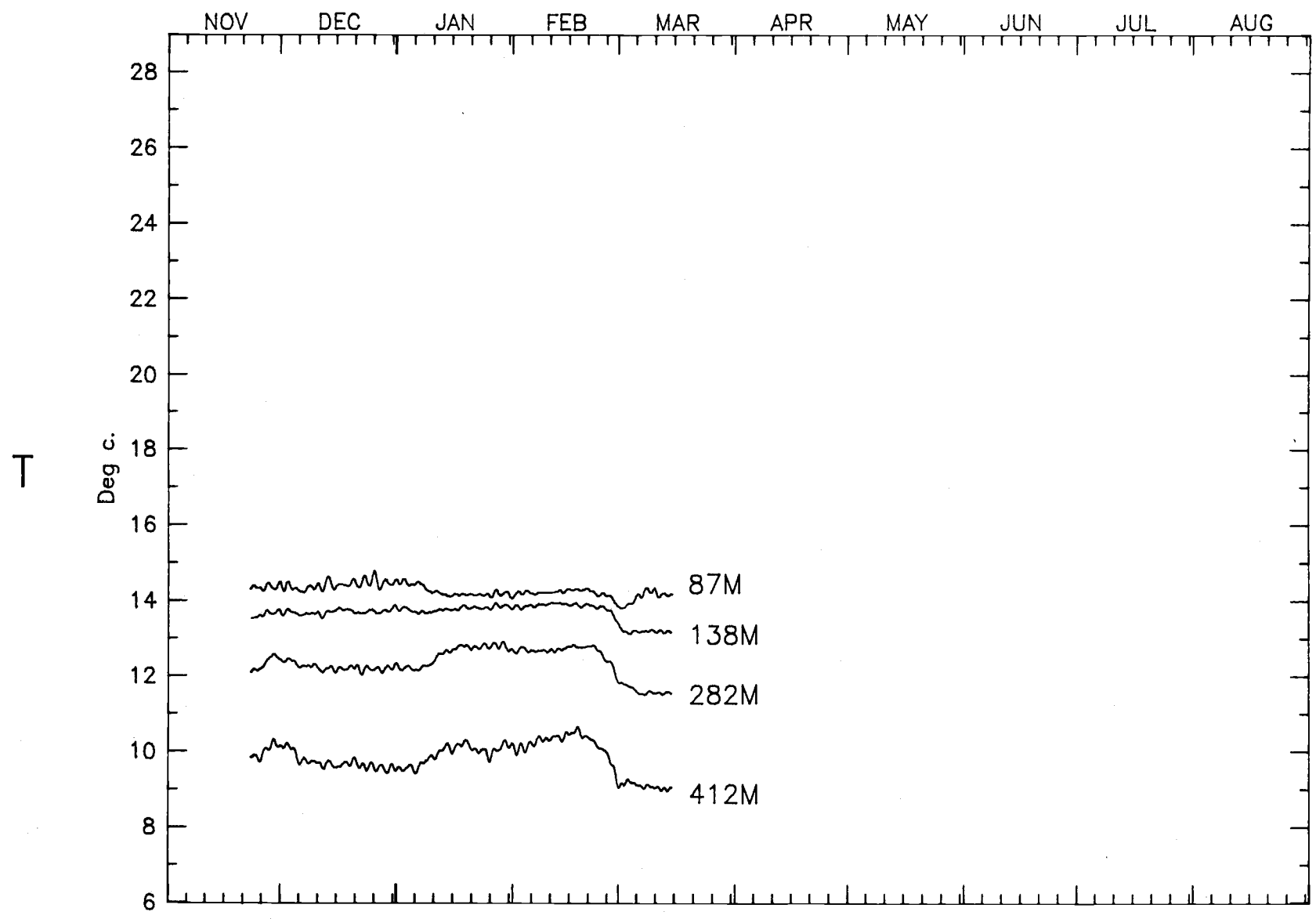


10 South Outer Slope Period VI



10 South Outer Slope Period I

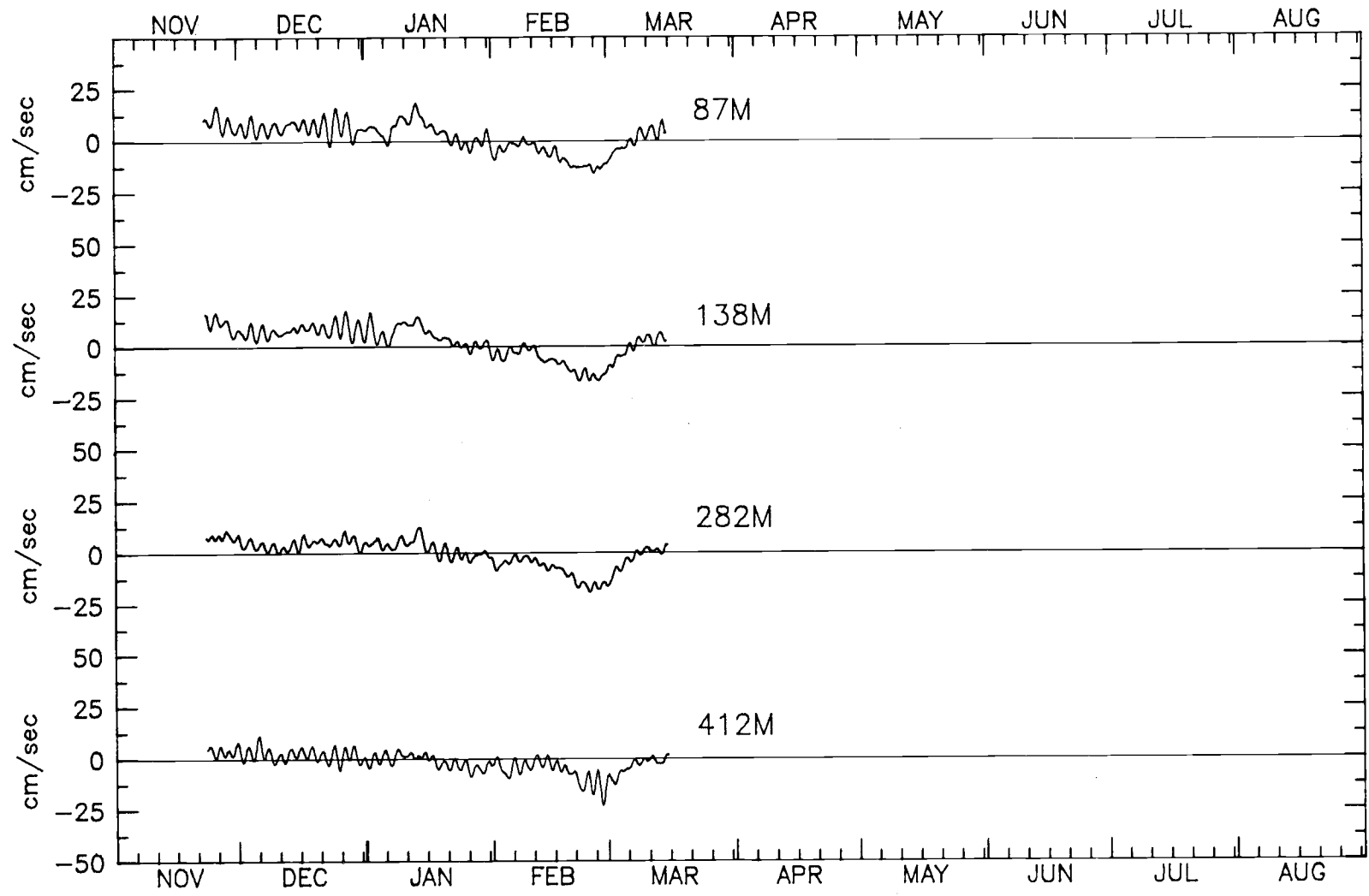
1982



10 South Outer Slope Period I

1982

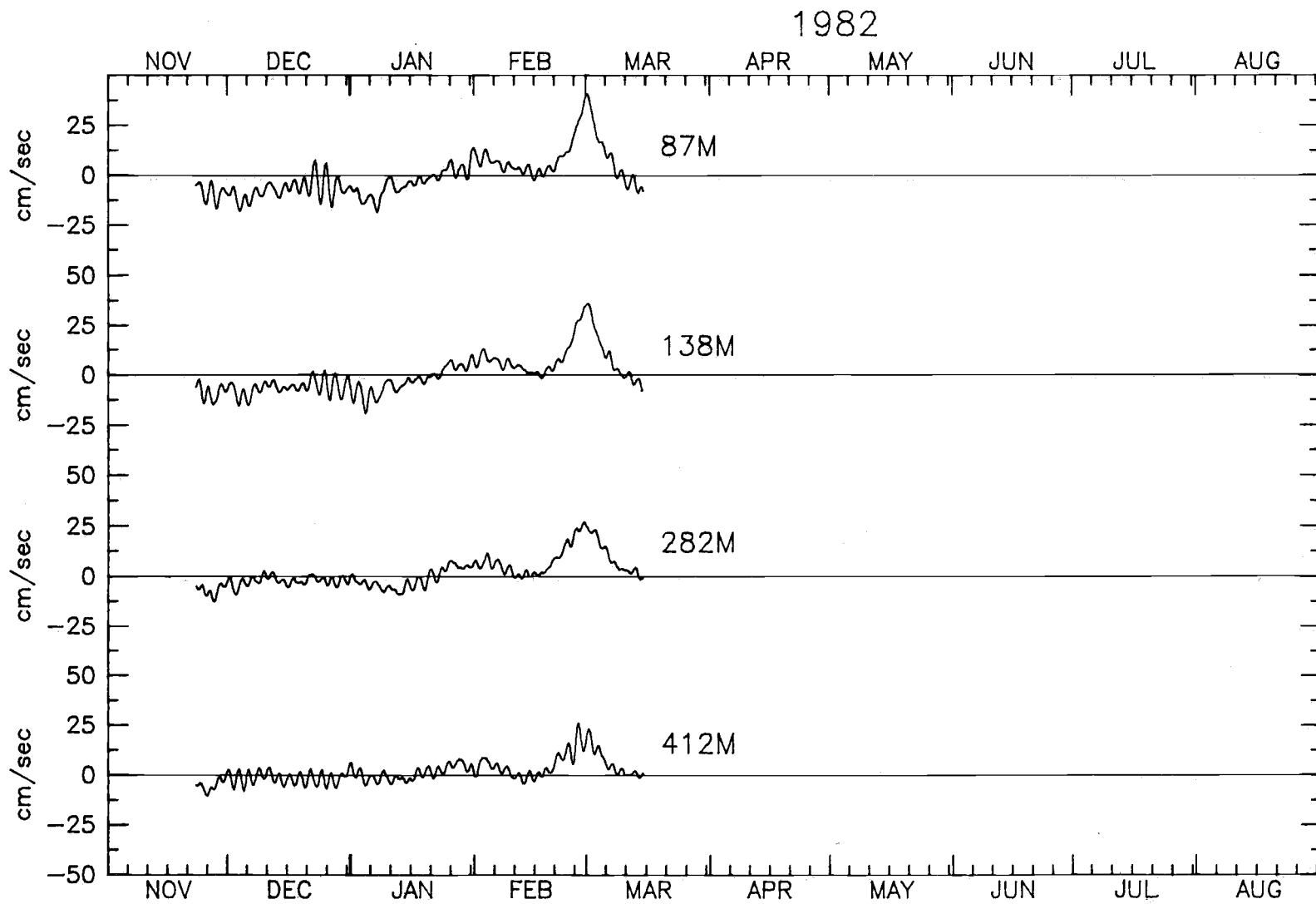
U



170

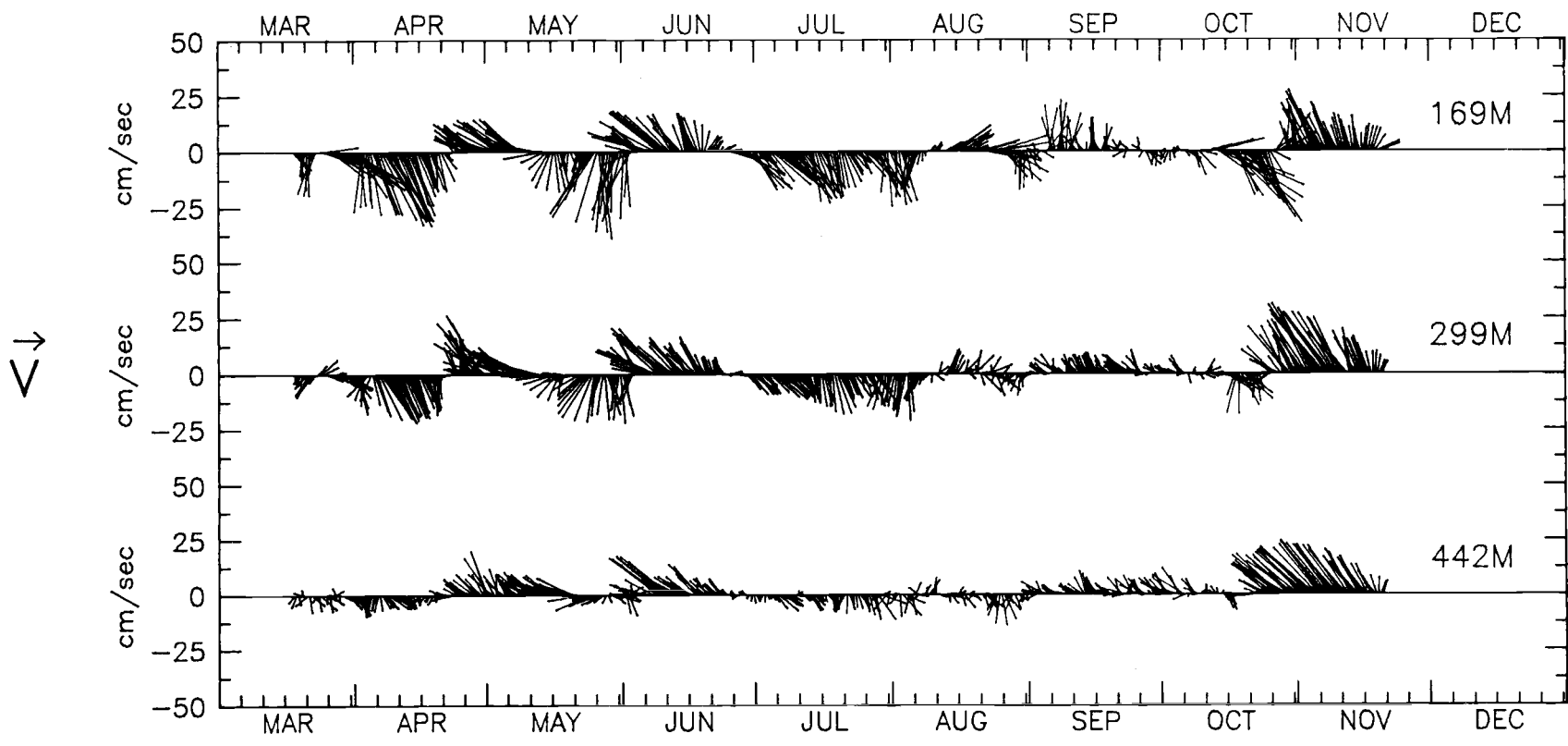
10 South Outer Slope Period I

V



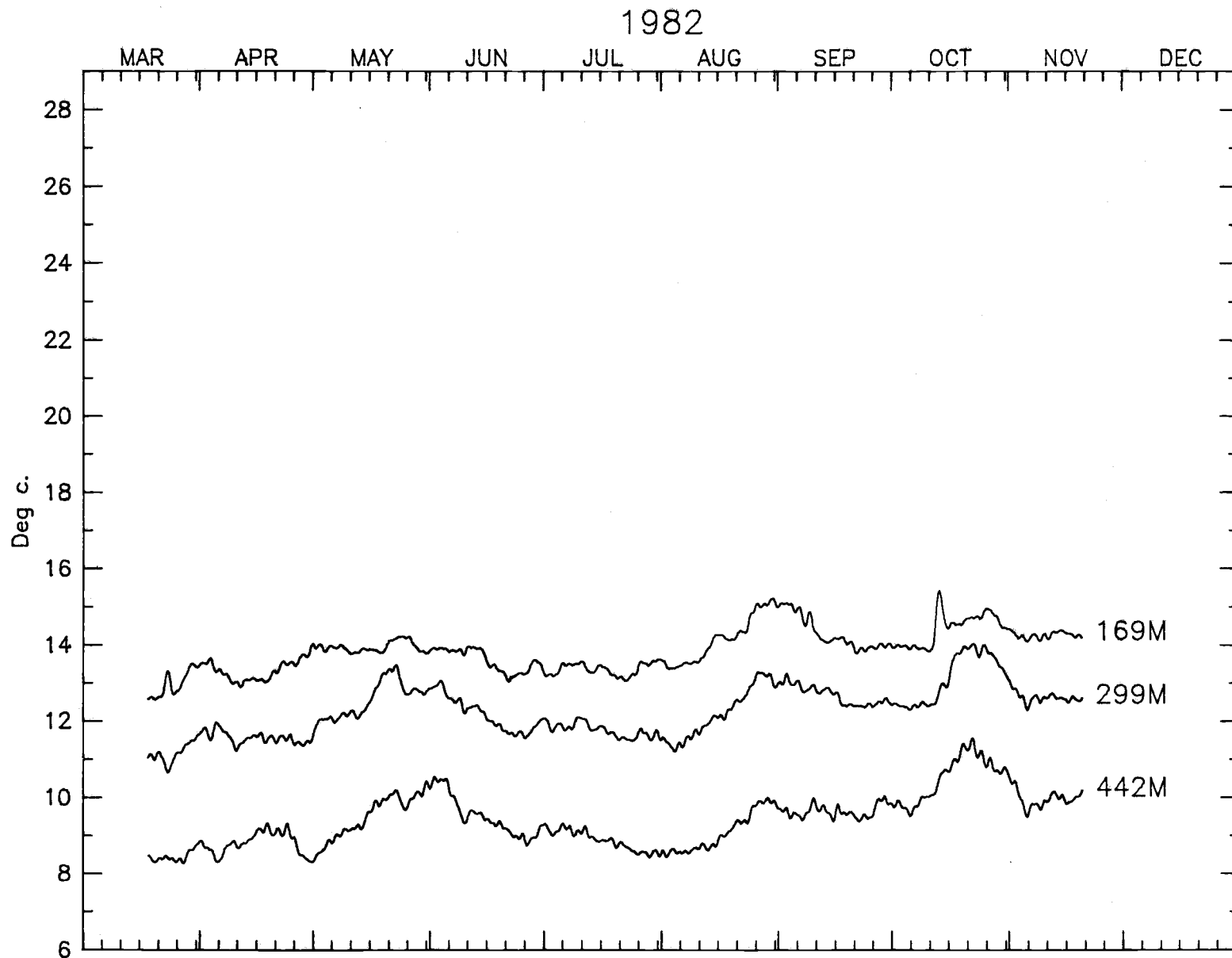
10 South Outer Slope Period I

1982

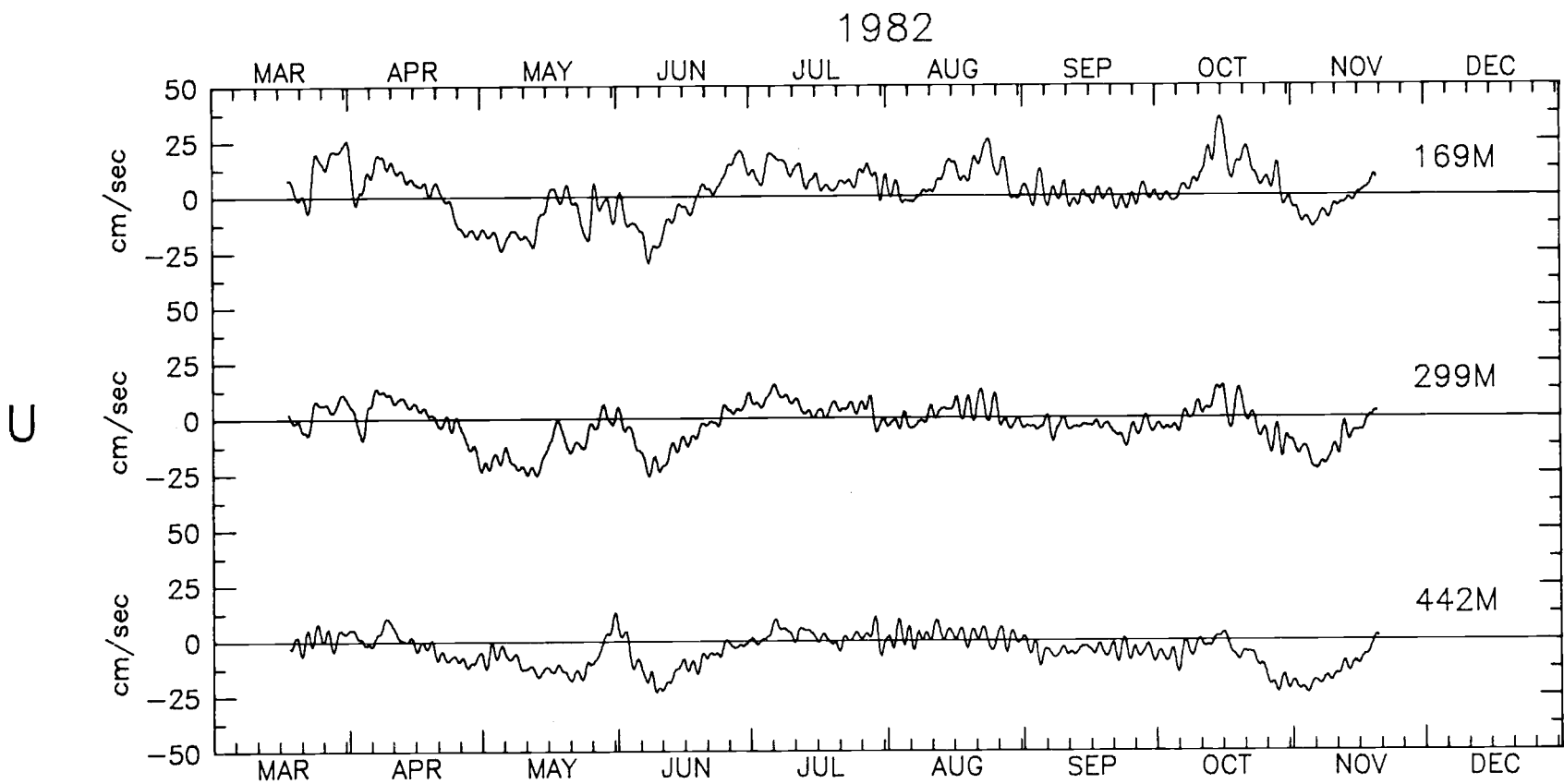


10 South Outer Slope Period II

T

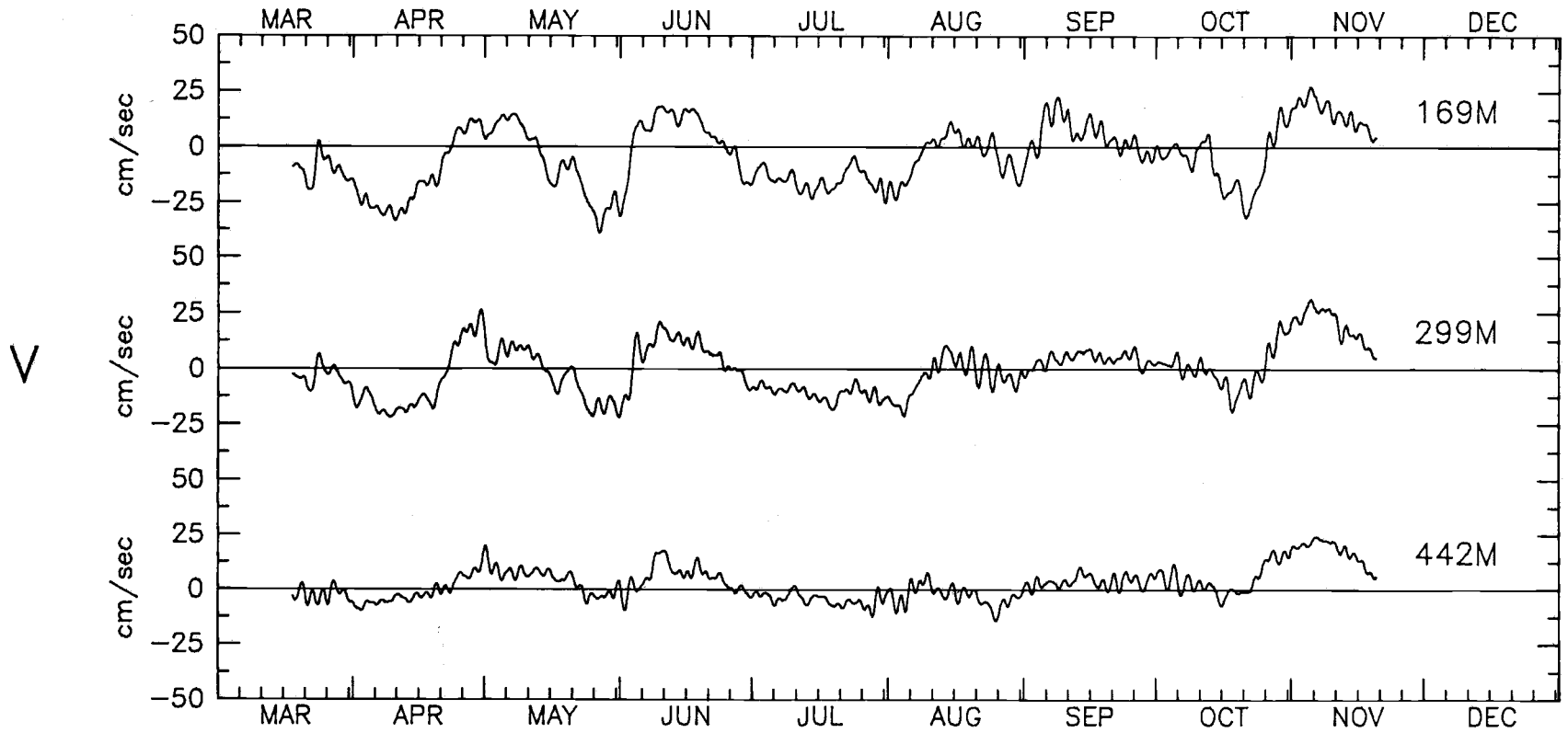


10 South Outer Slope Period II



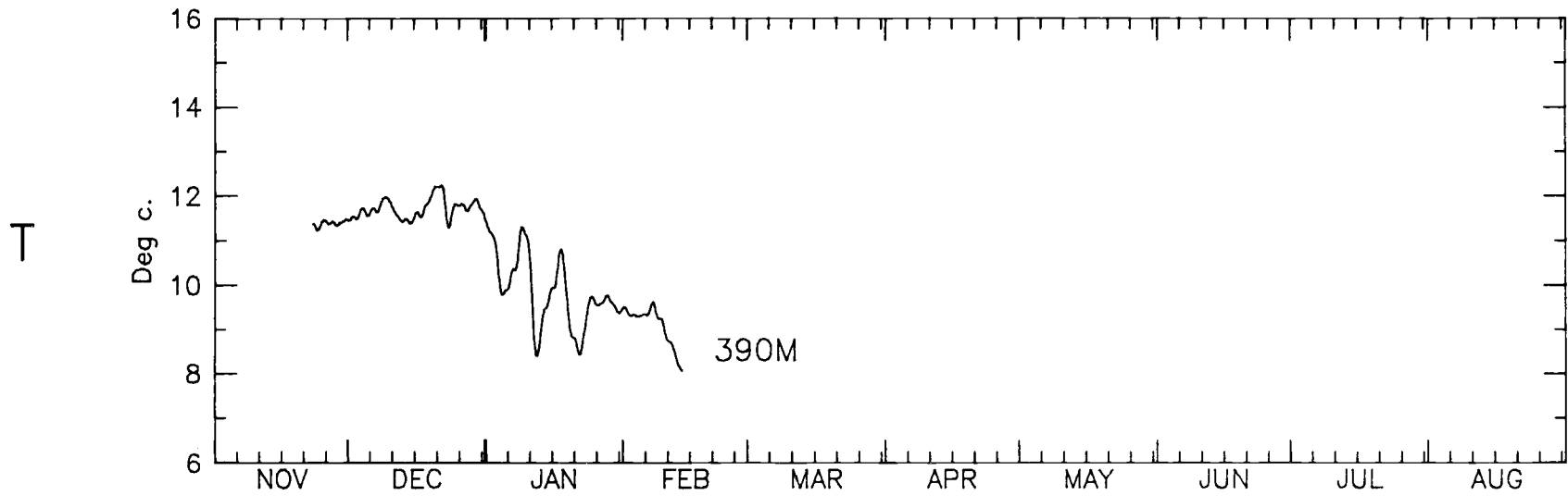
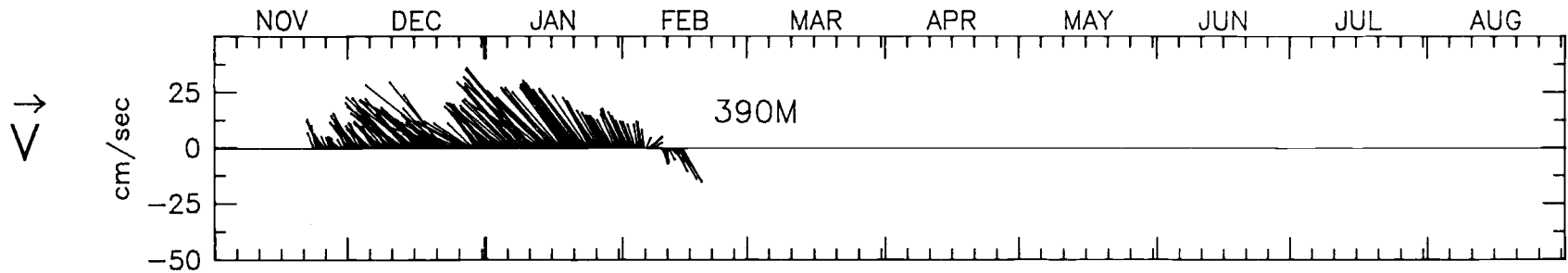
10 South Outer Slope Period II

1982

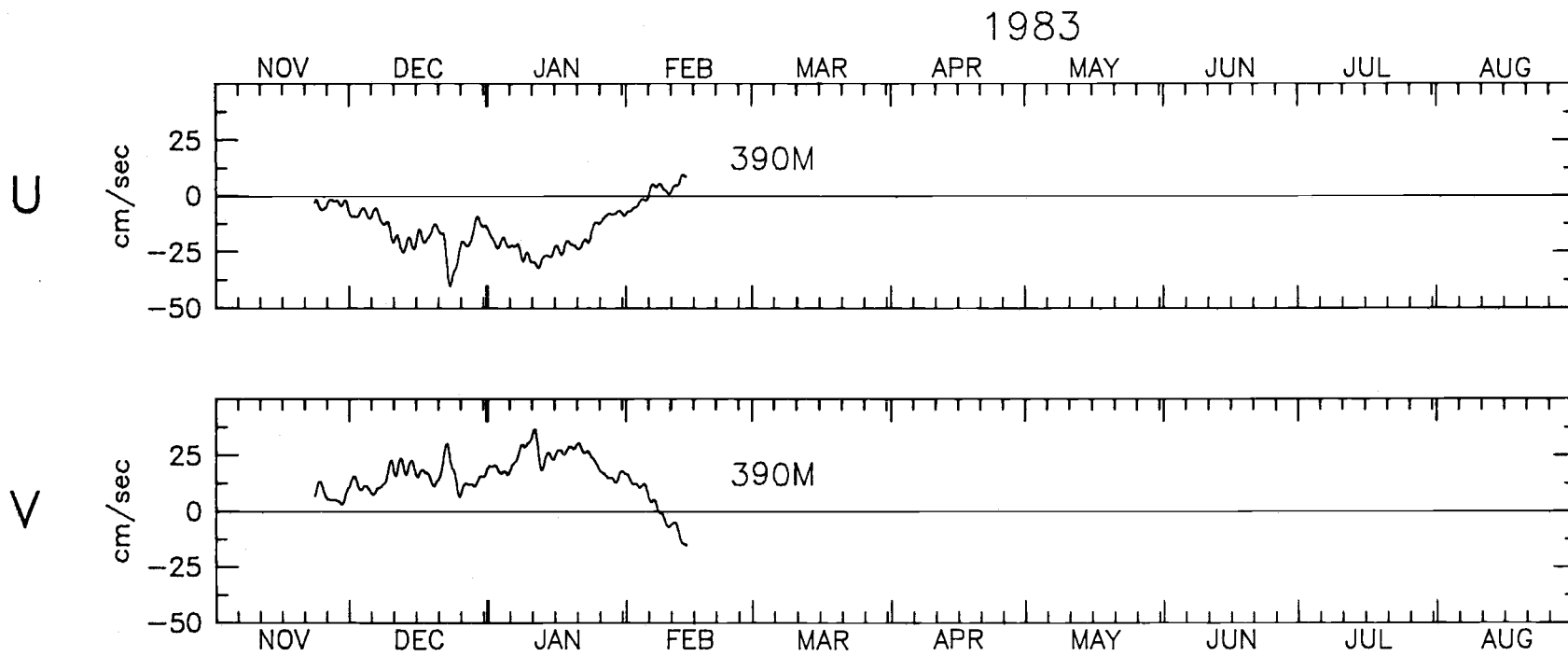


10 South Outer Slope Period II

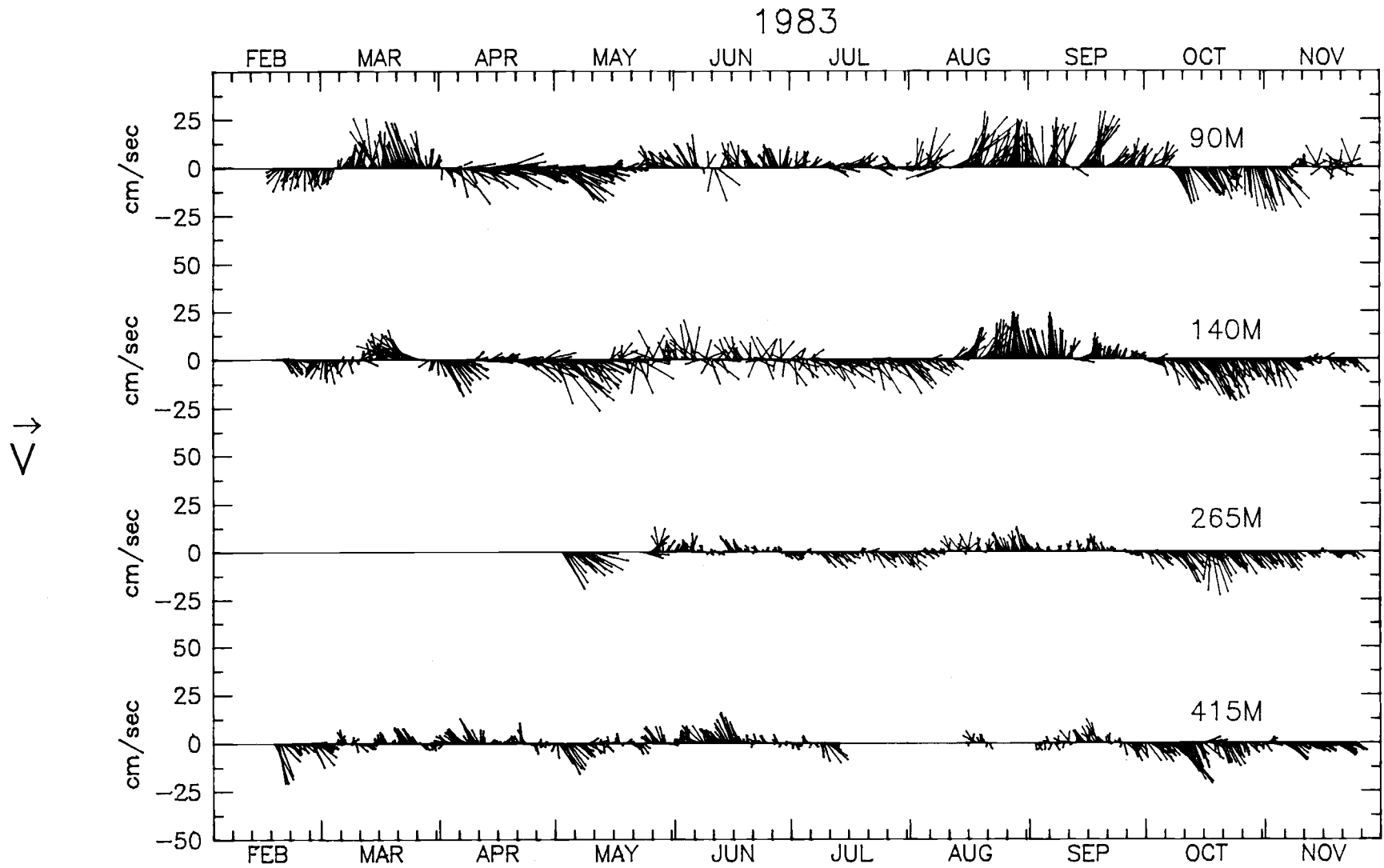
1983



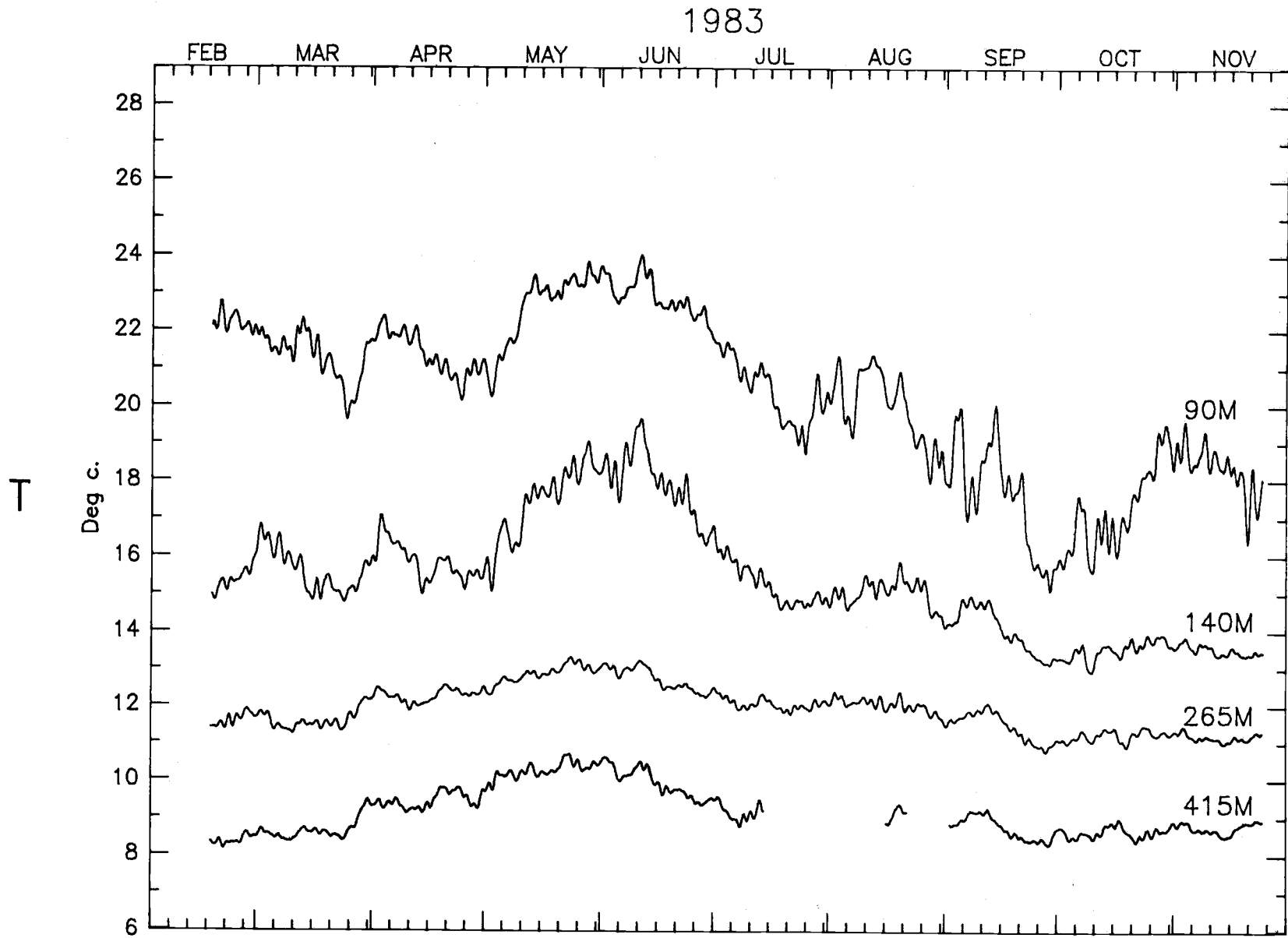
10 South Outer Slope Period III



10 South Outer Slope Period III

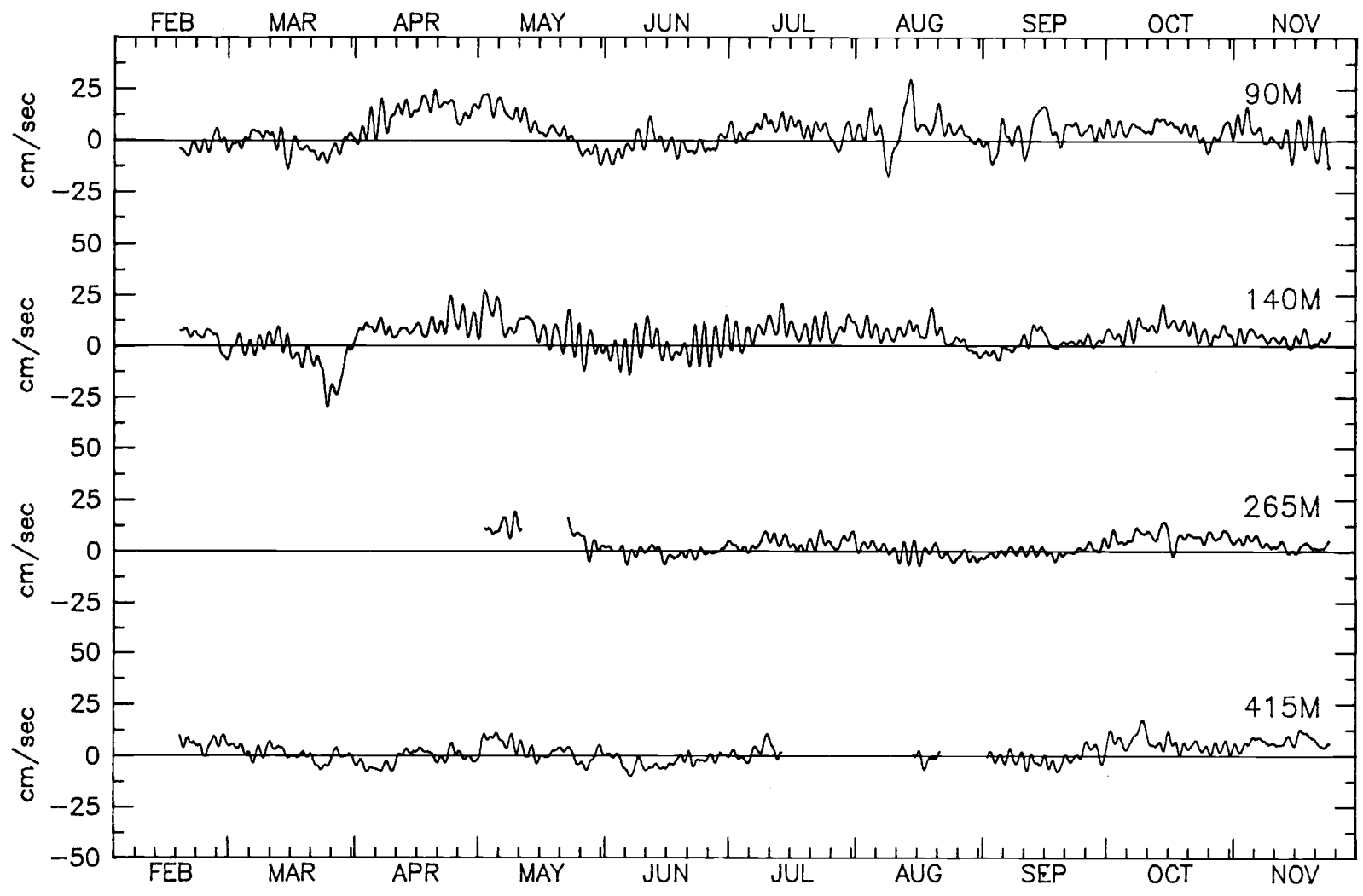


10 South Outer Slope Period IV



10 South Outer Slope Period IV

1983

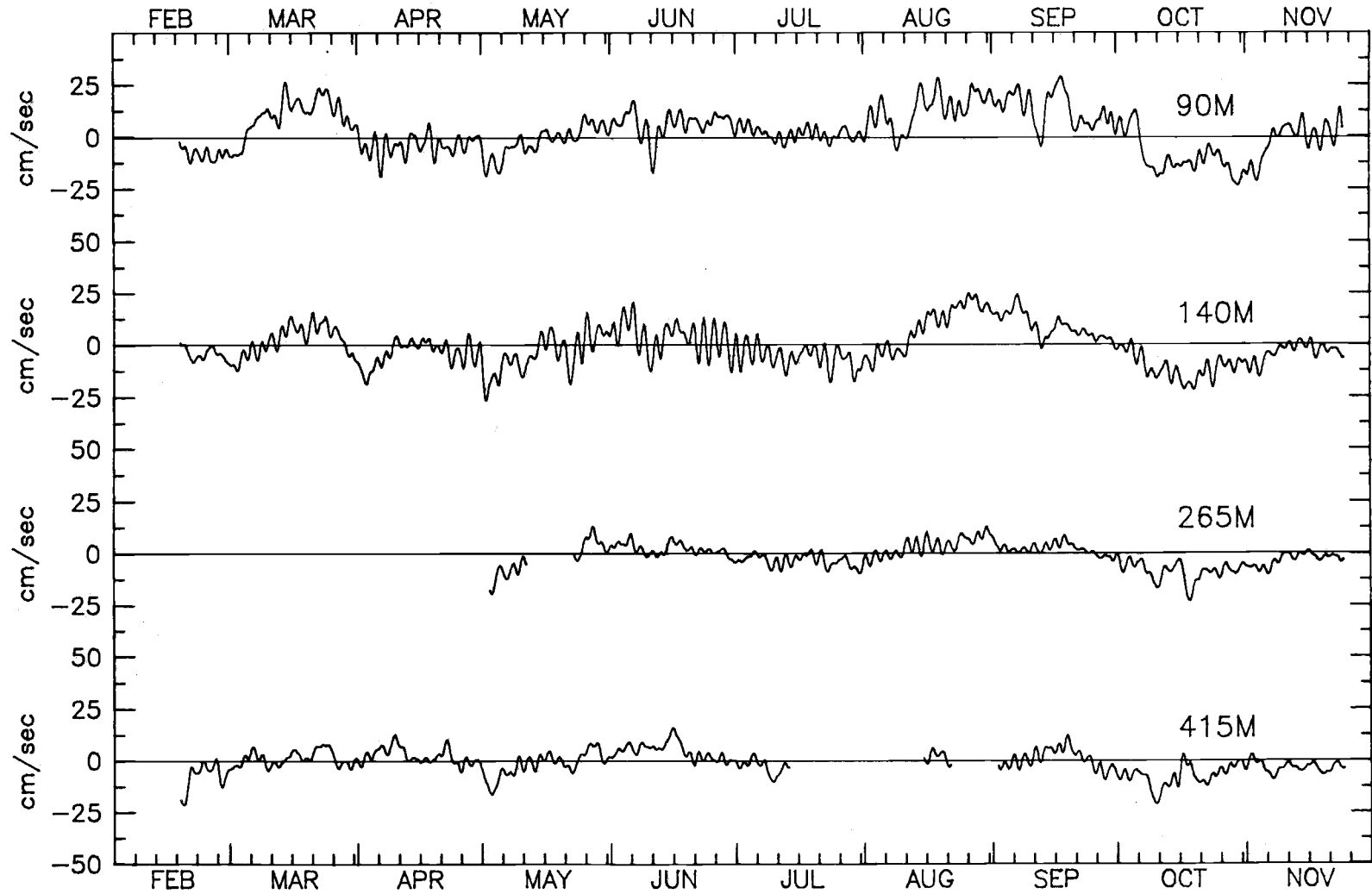


U

180

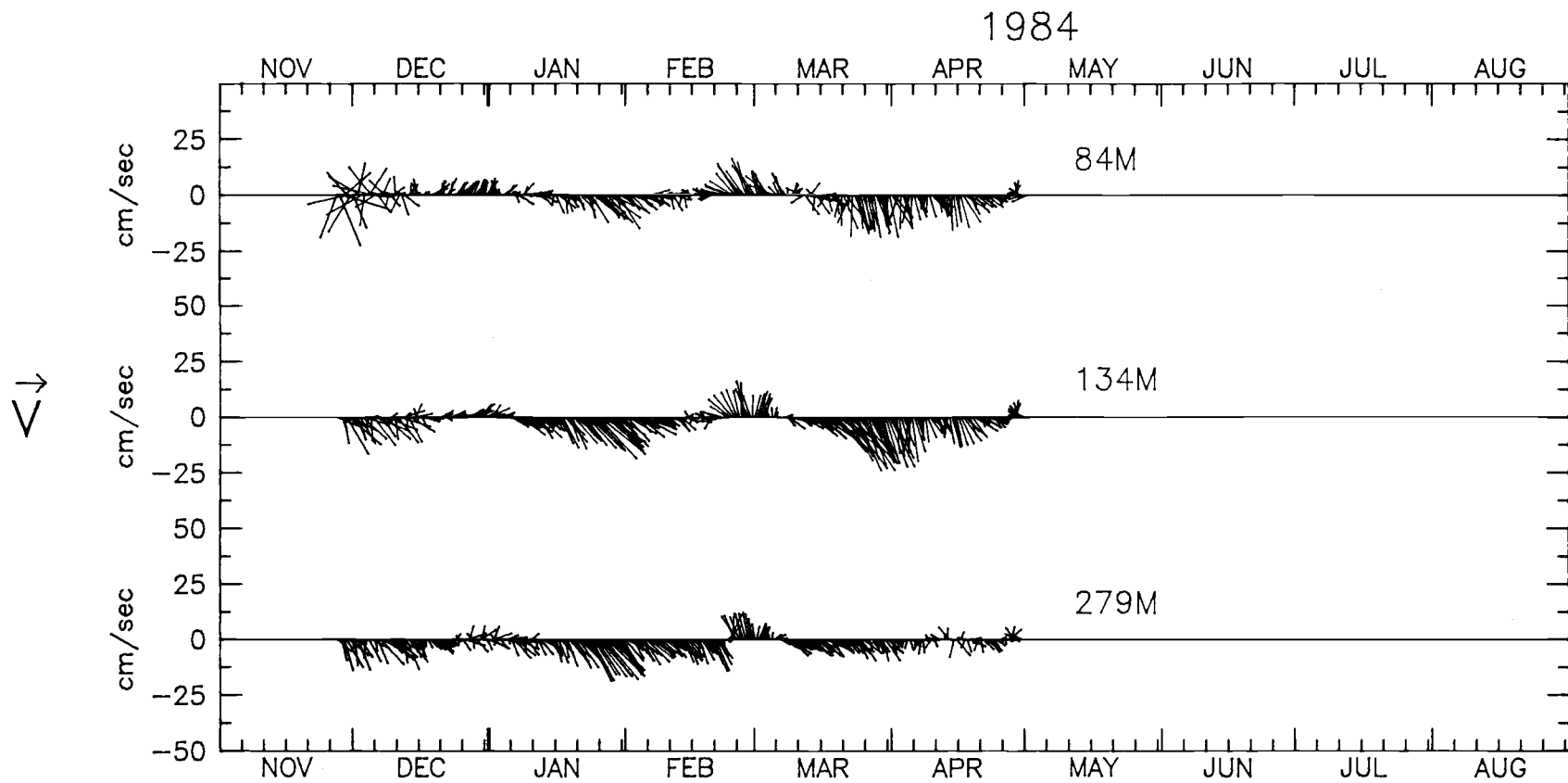
10 South Outer Slope Period IV

1983



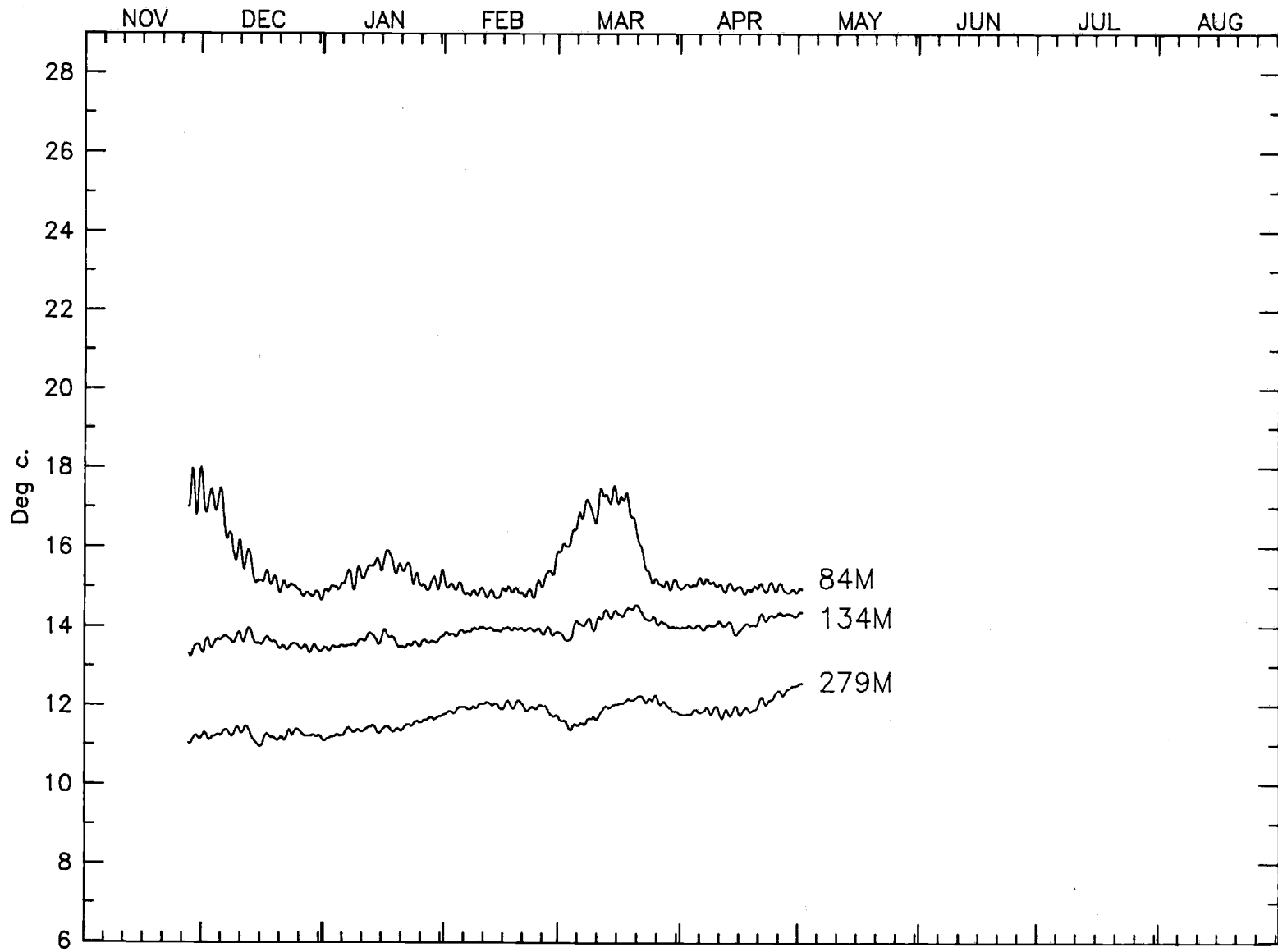
V

10 South Outer Slope Period IV



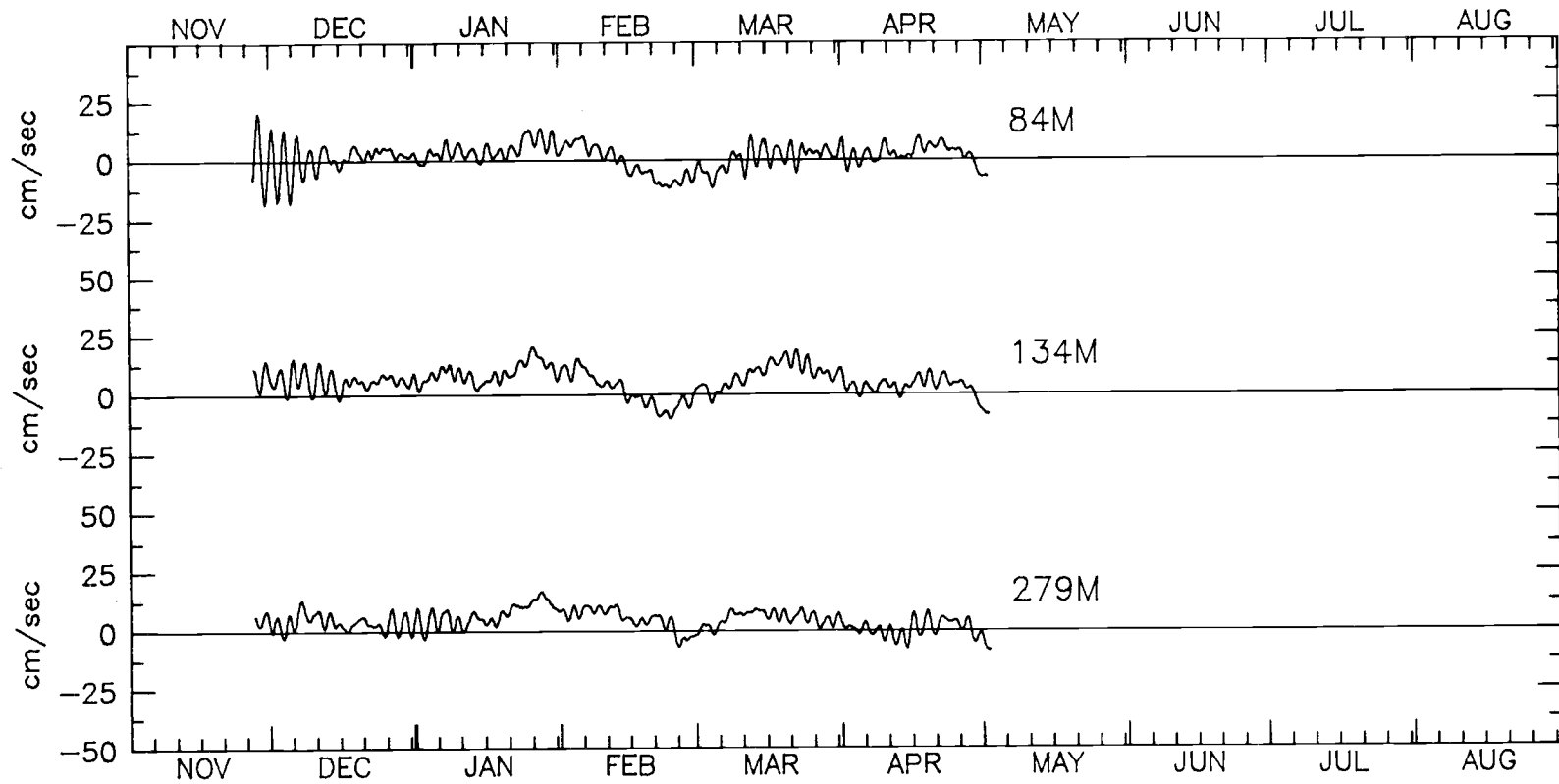
10 South Outer Slope Period V

1984



10 South Outer Slope Period V

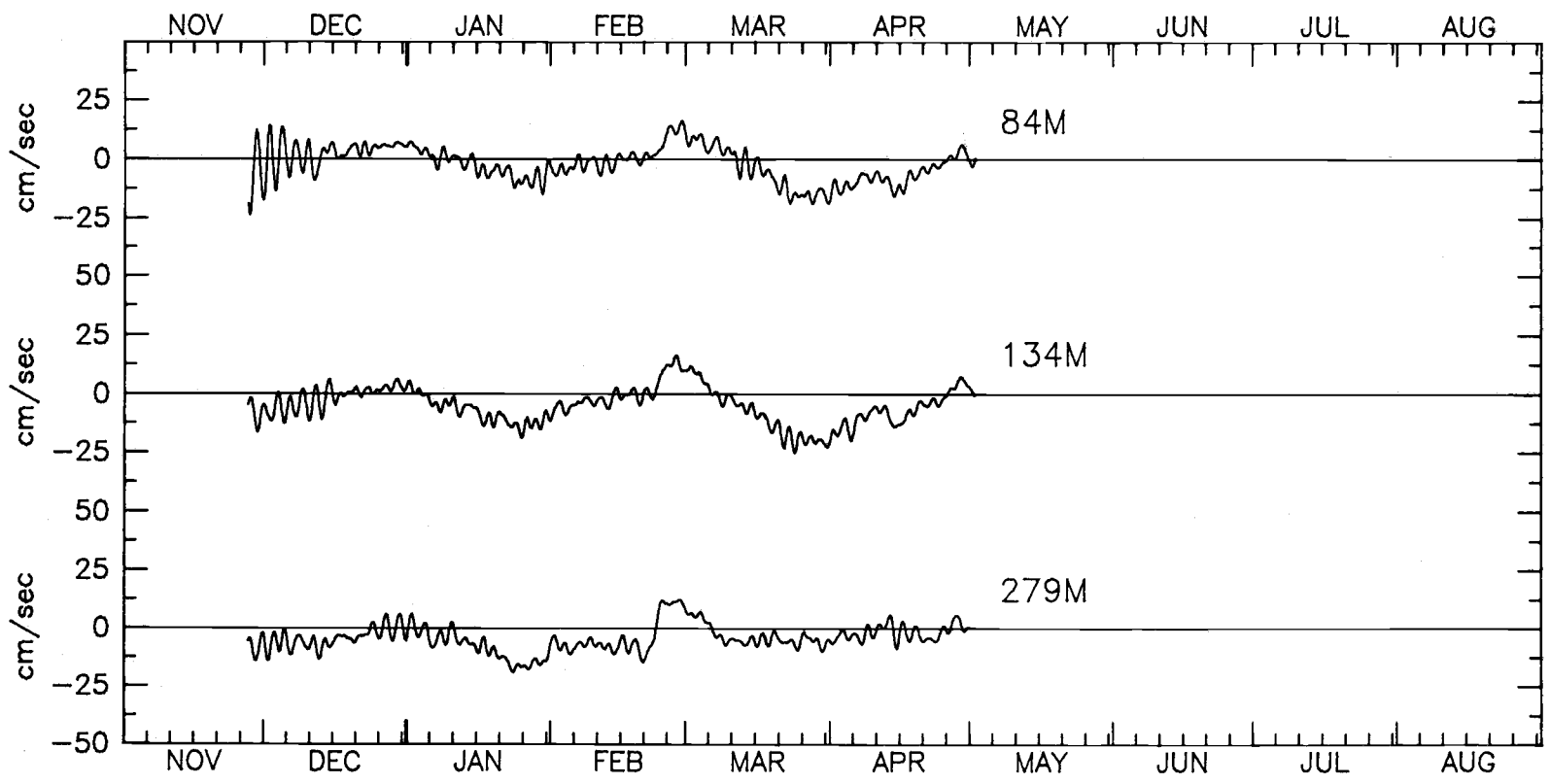
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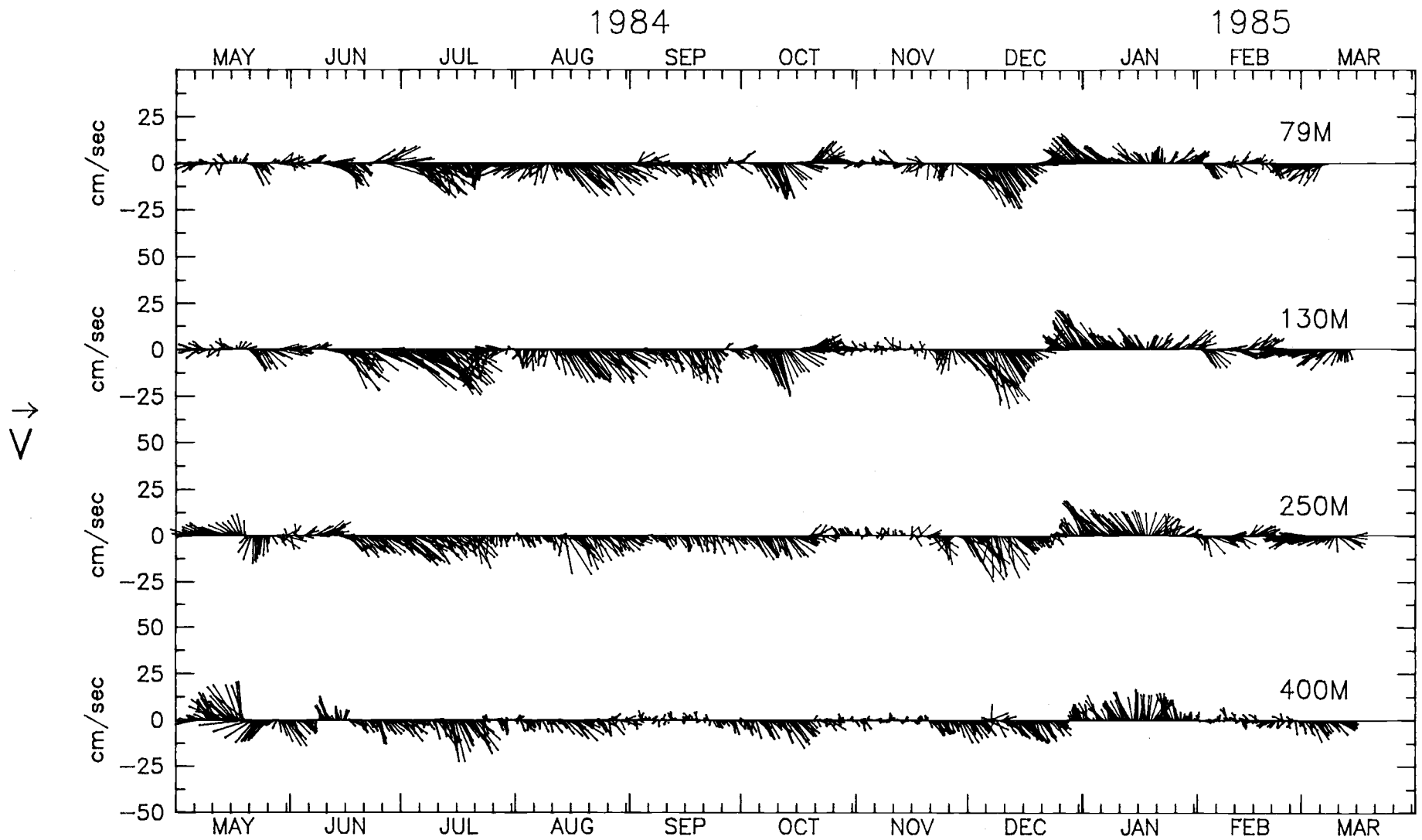
10 South Outer Slope Period V

1984



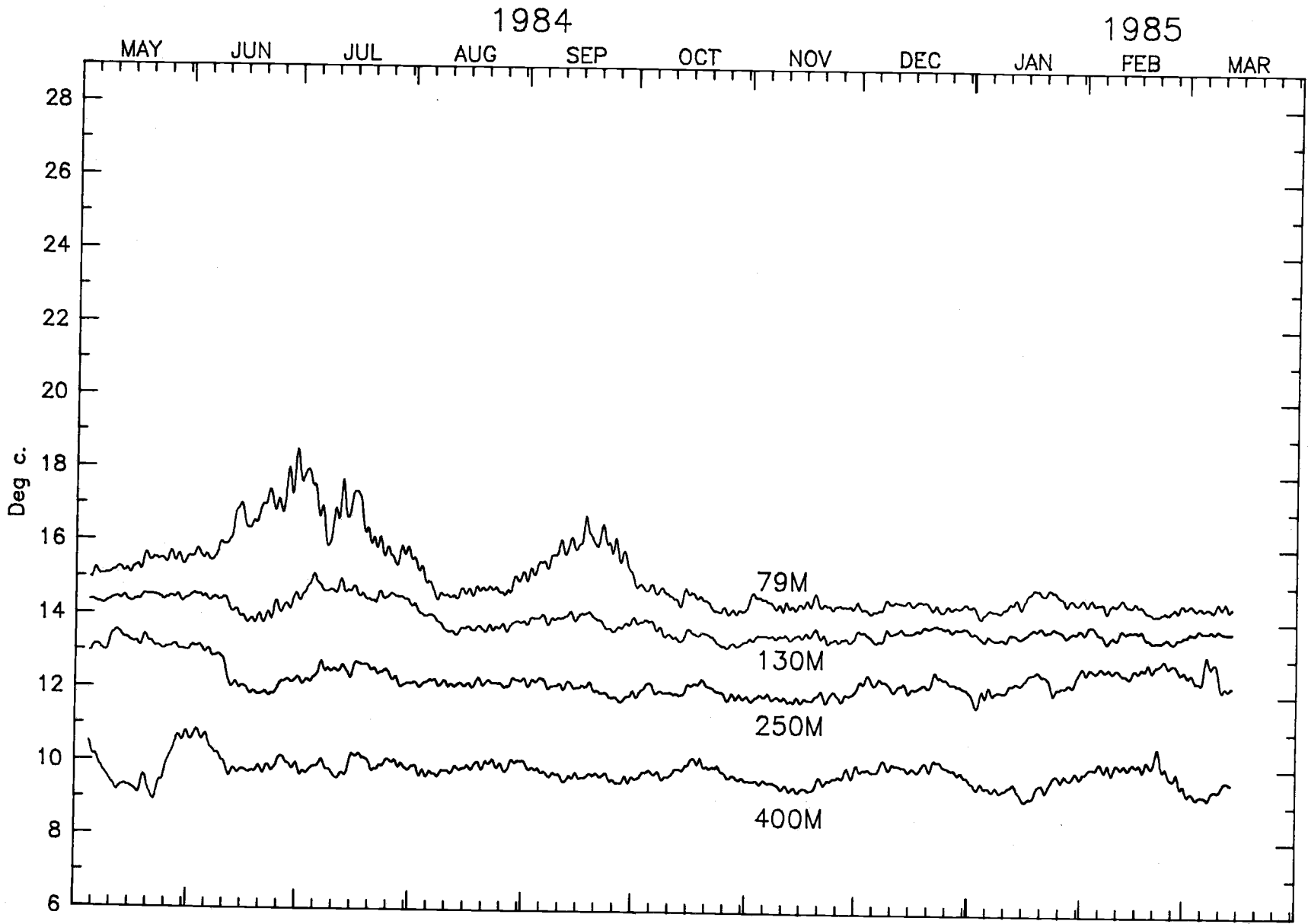
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10 South Outer Slope Period V



10 South Outer Slope Period VI

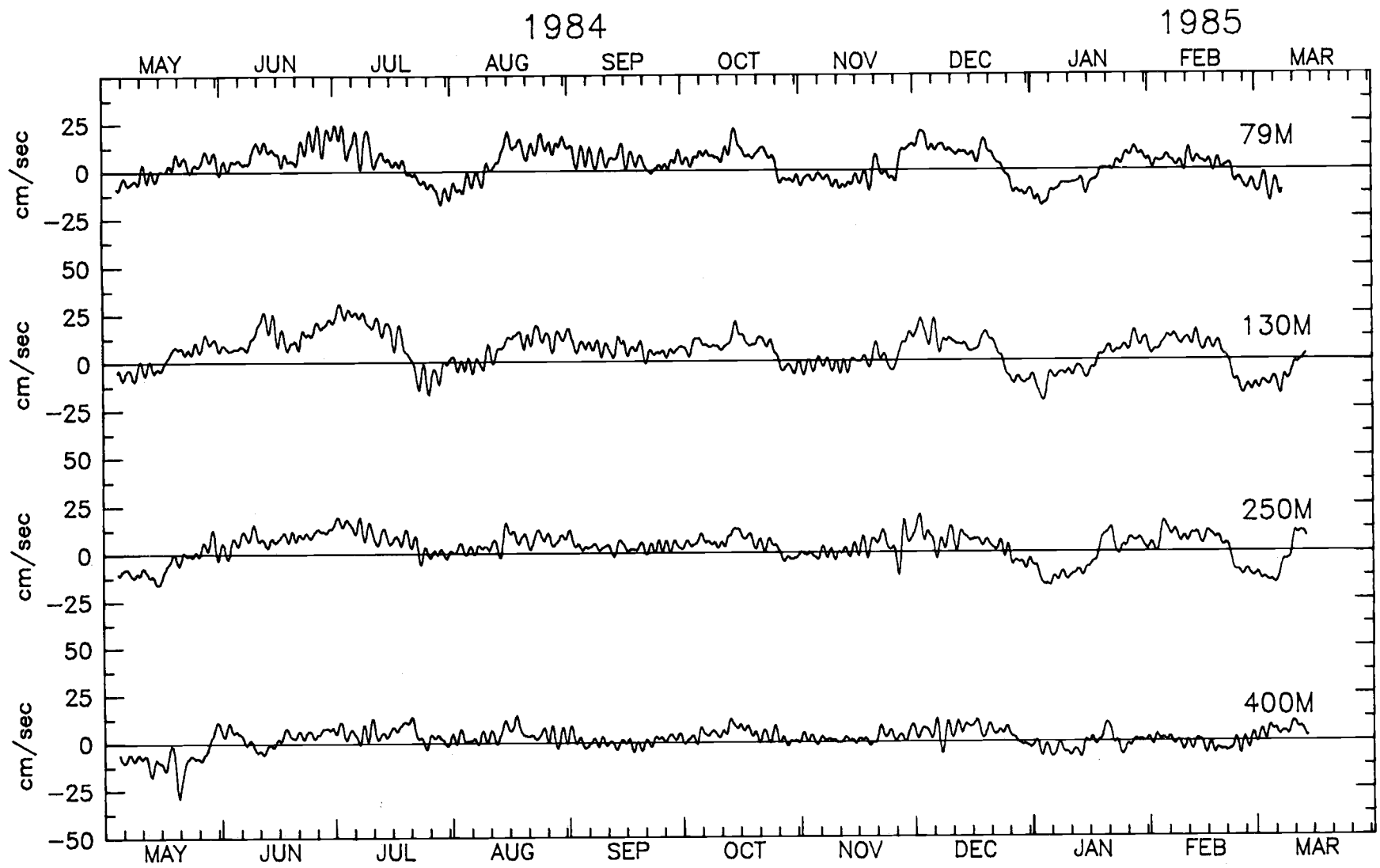
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187

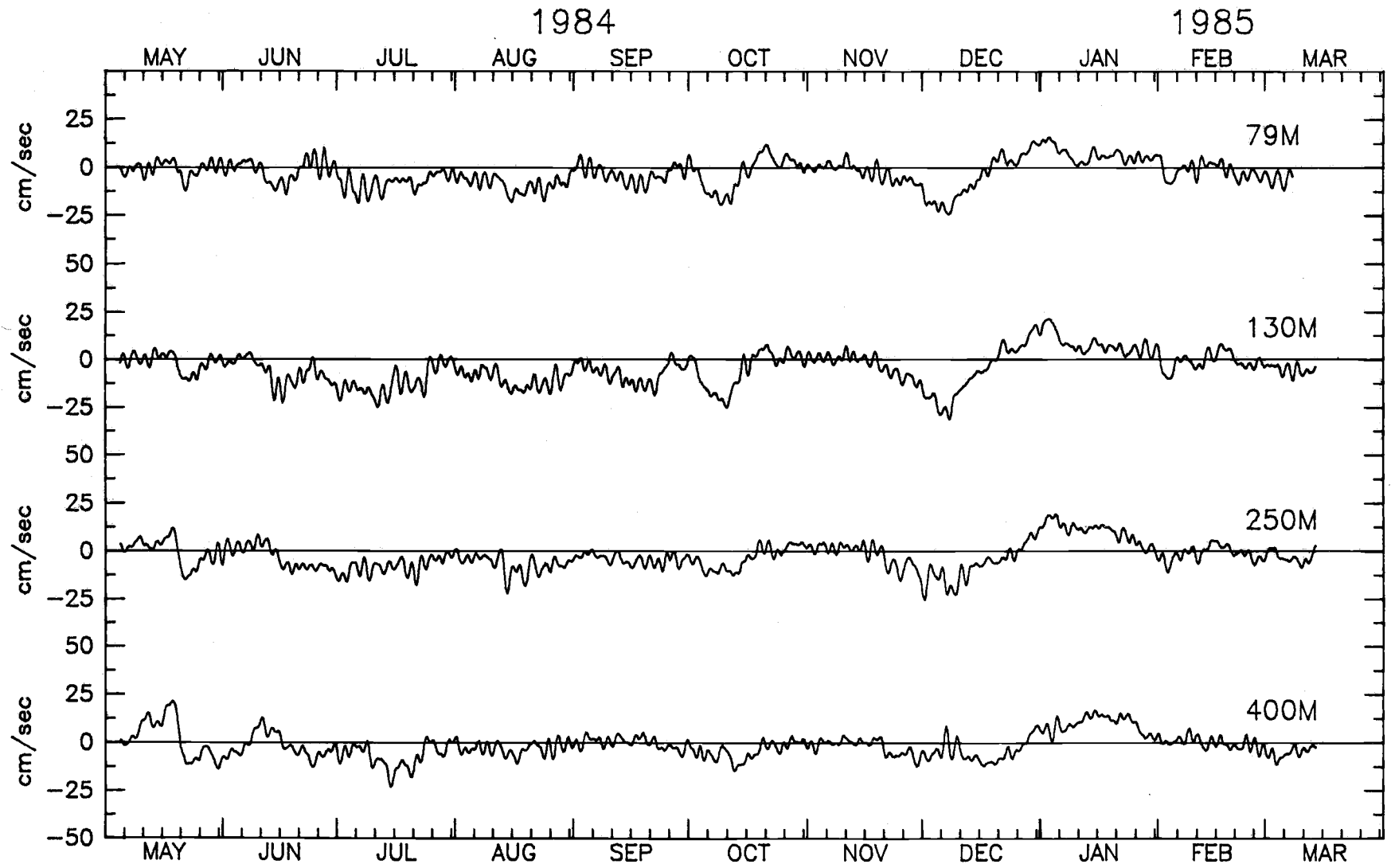
10 South Outer Slope Period VI

U

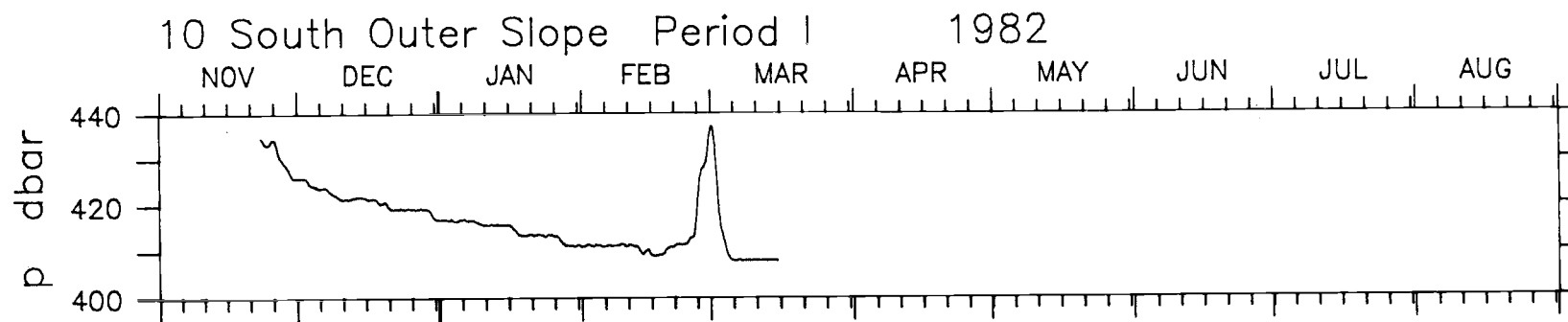
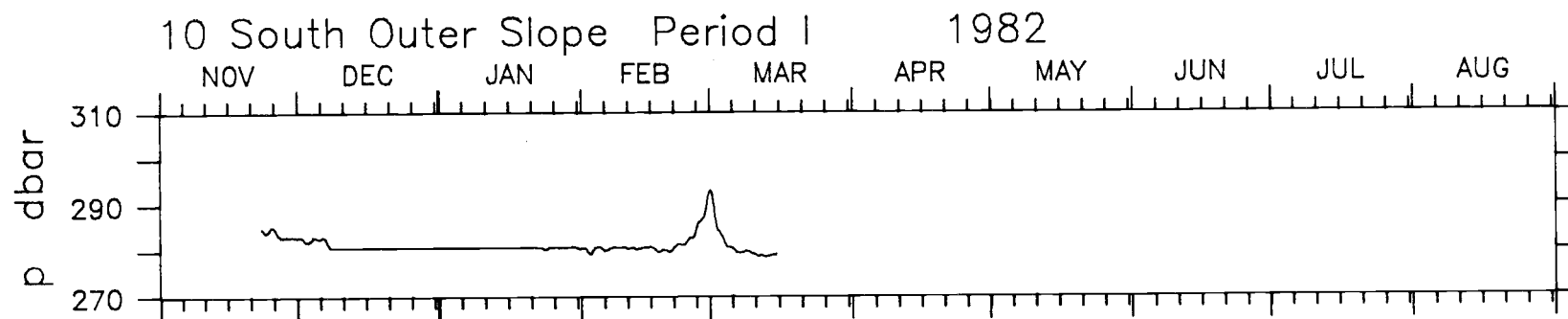
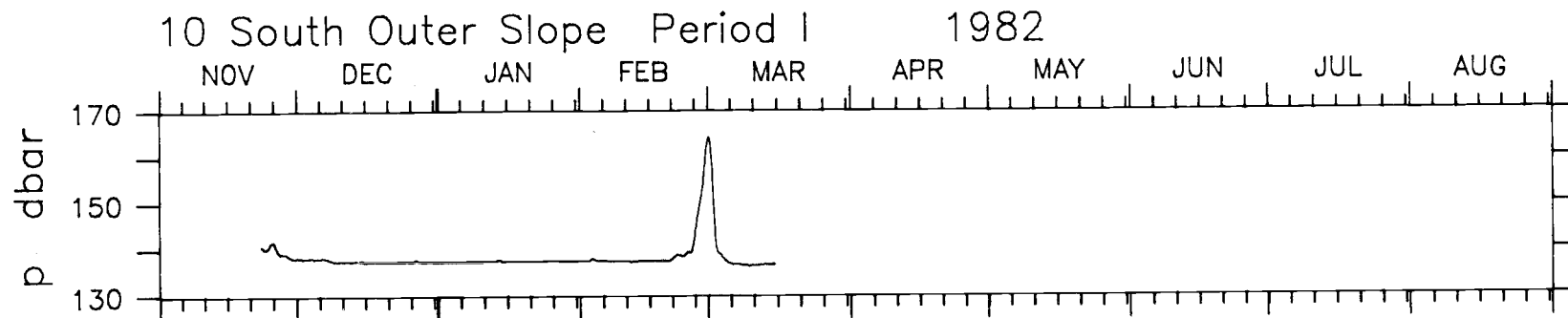
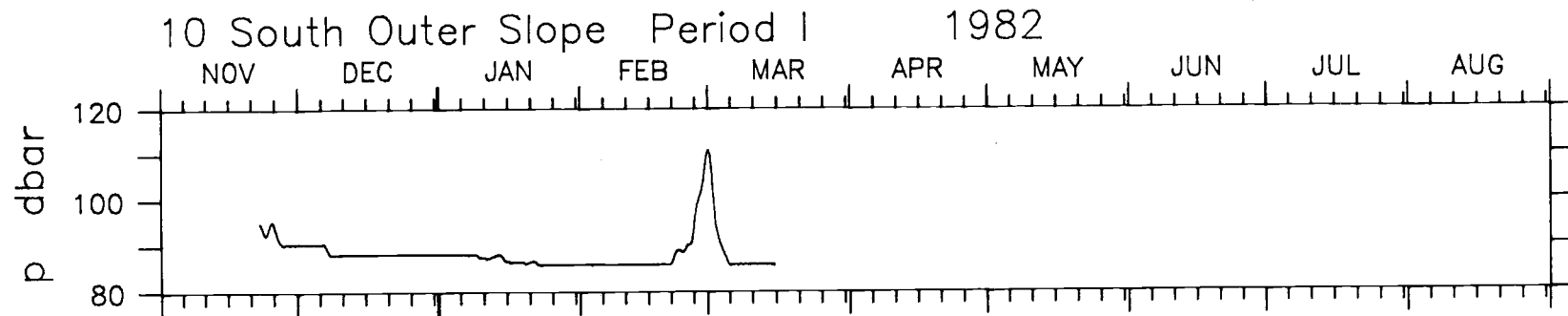


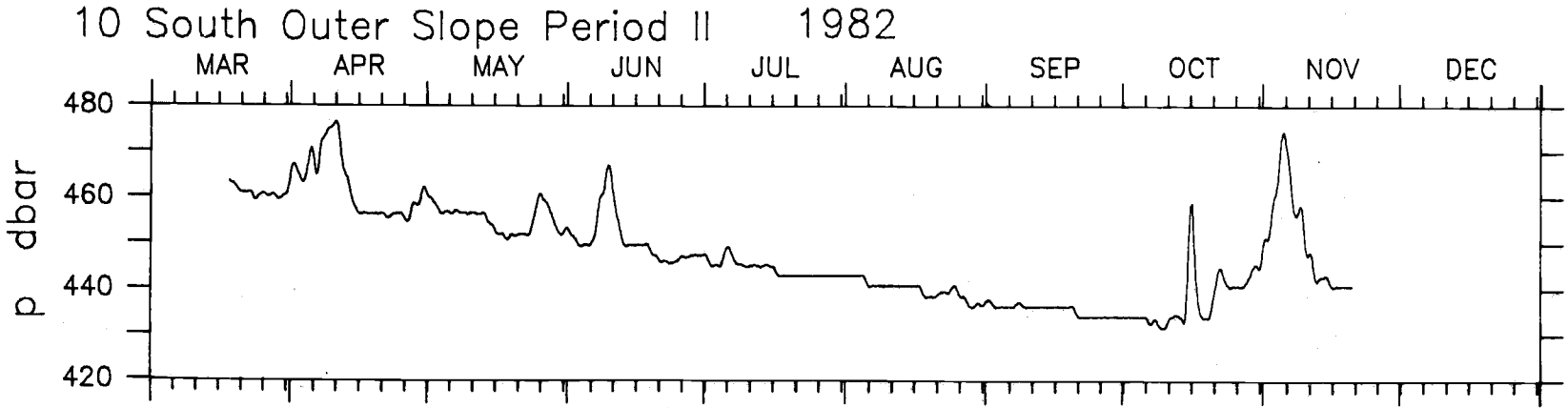
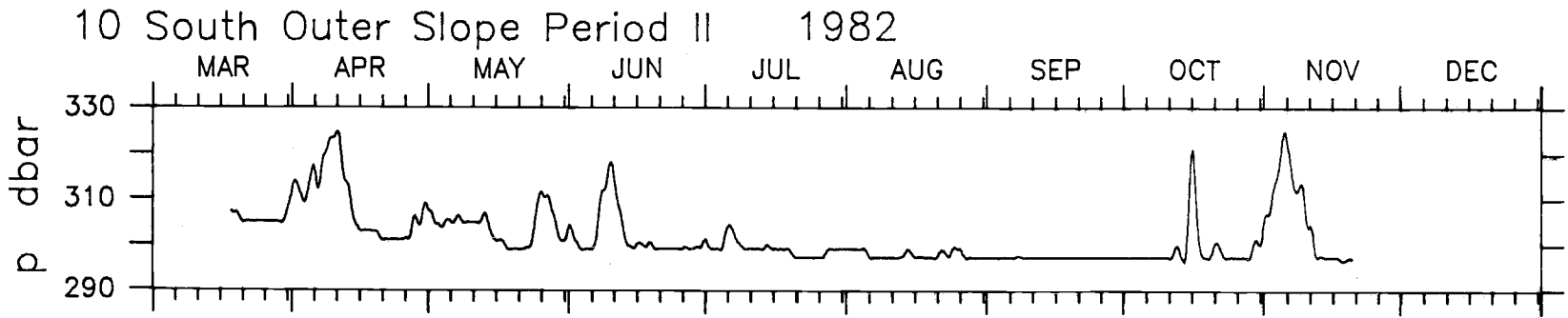
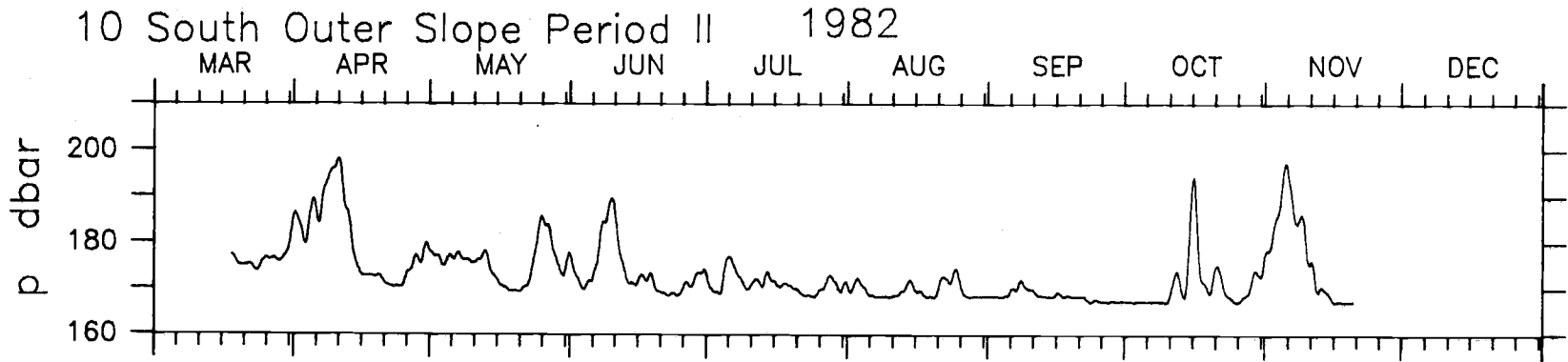
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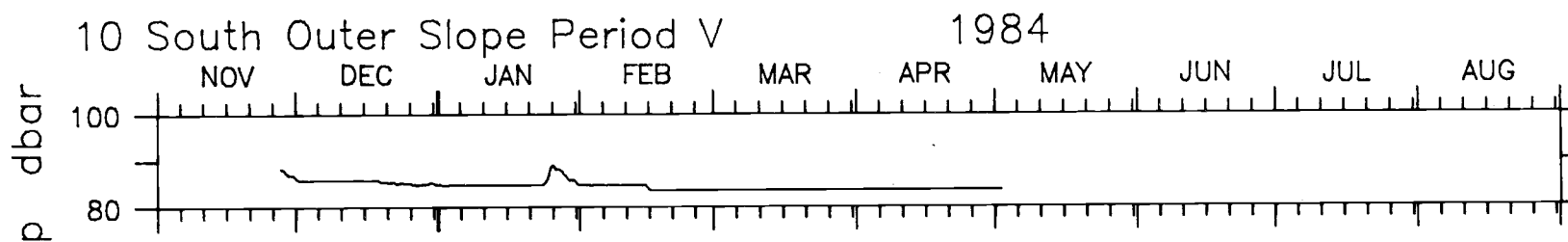
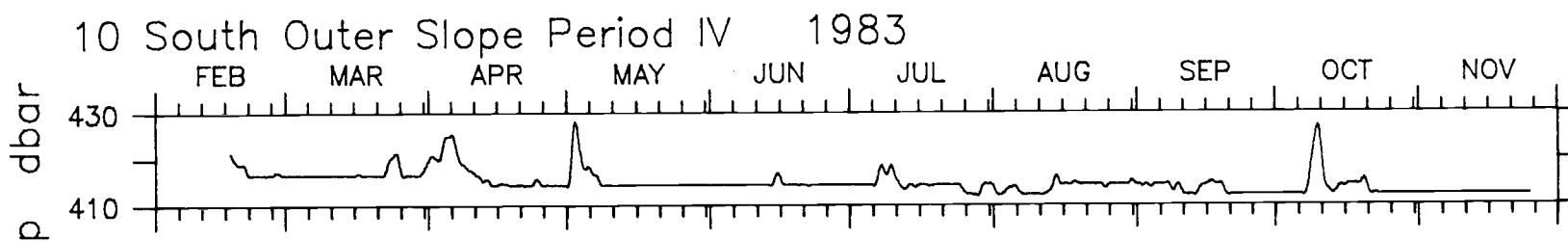
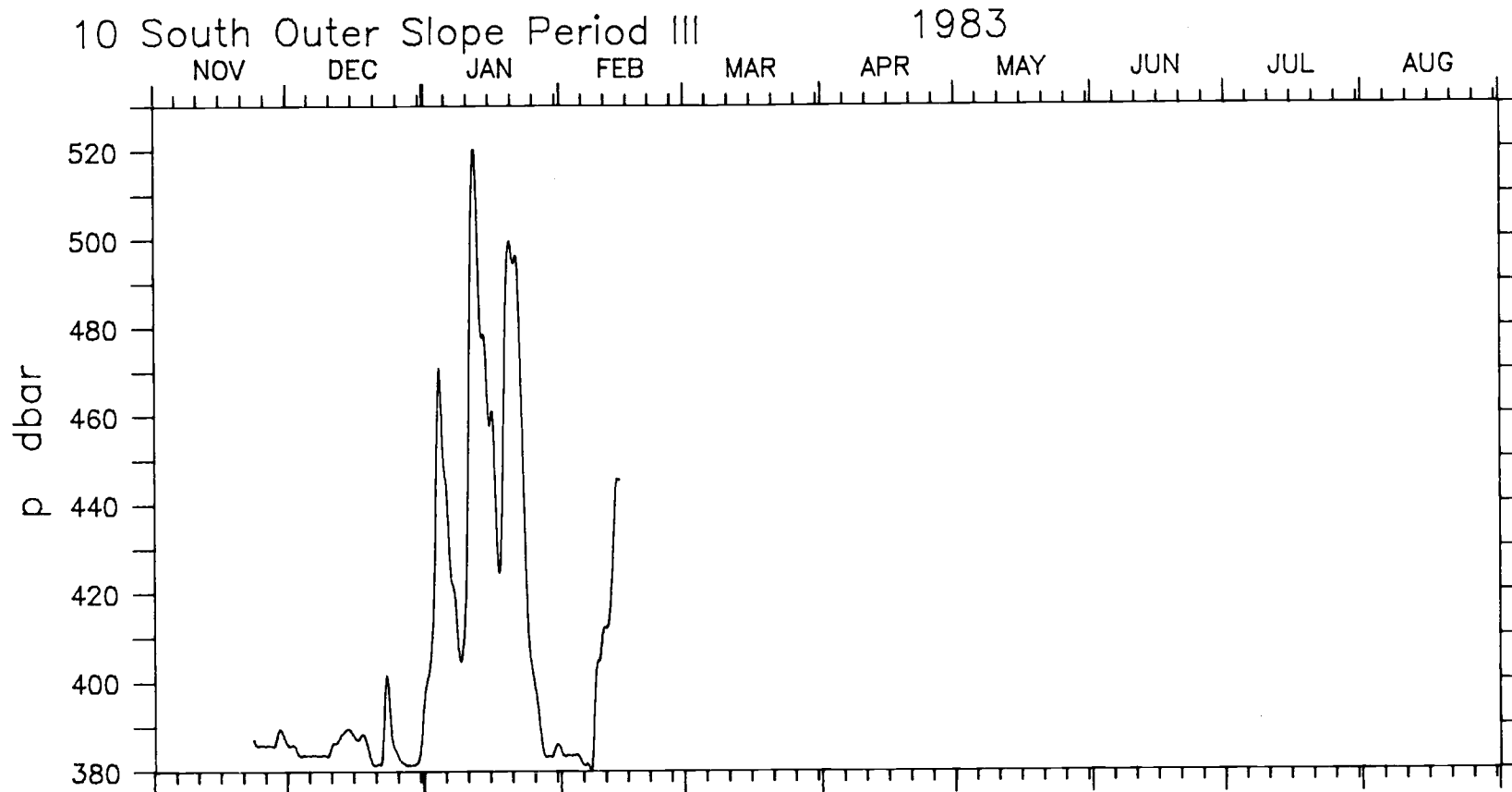
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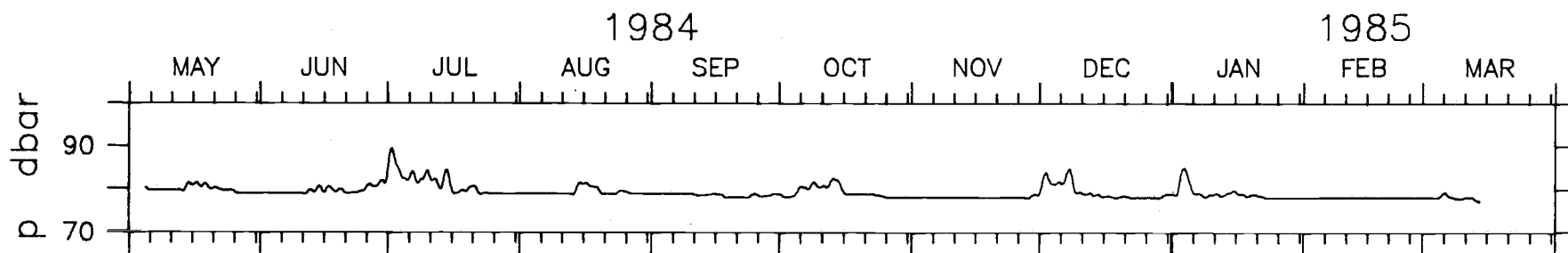


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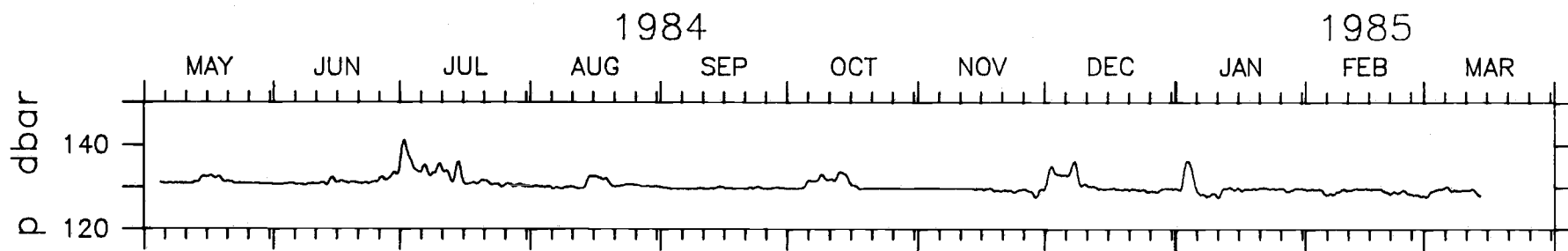




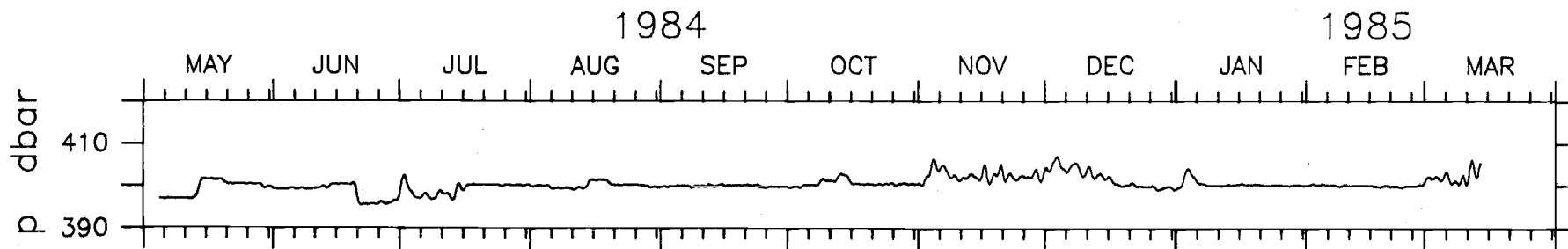




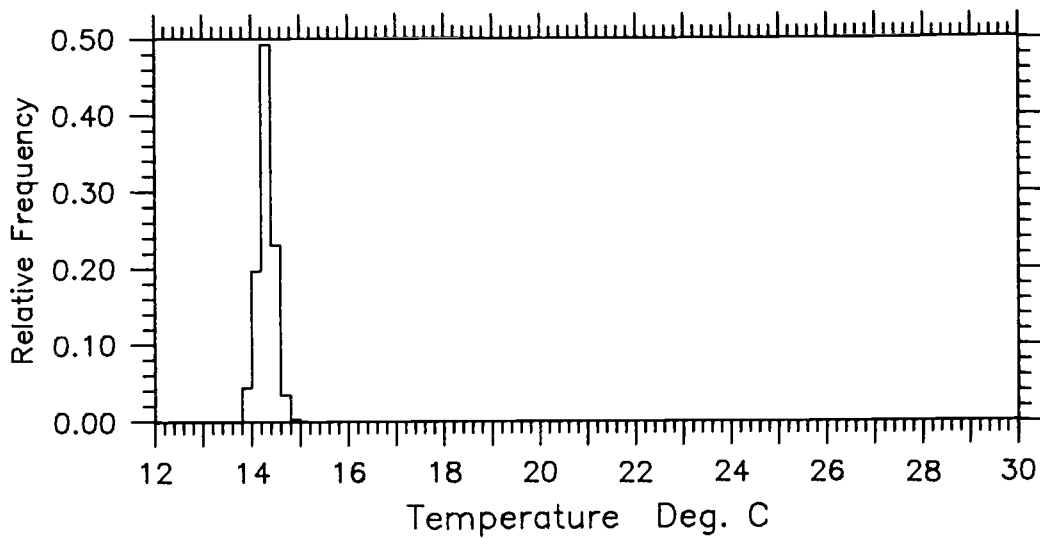
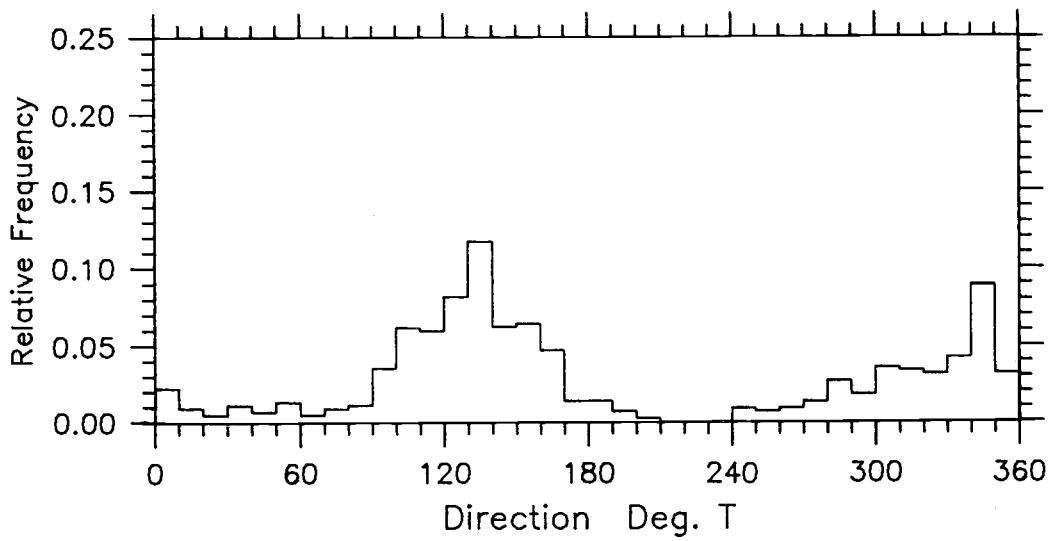
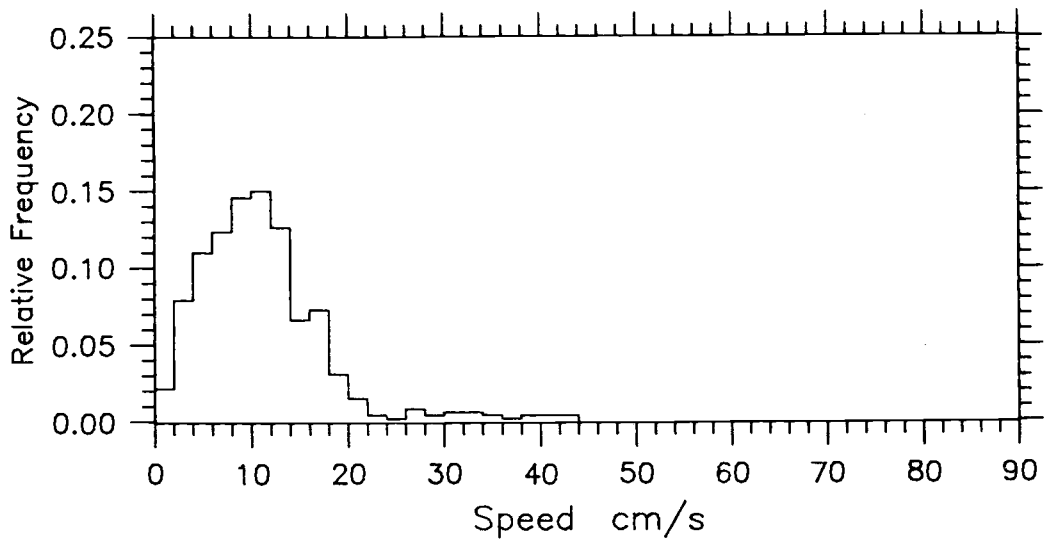
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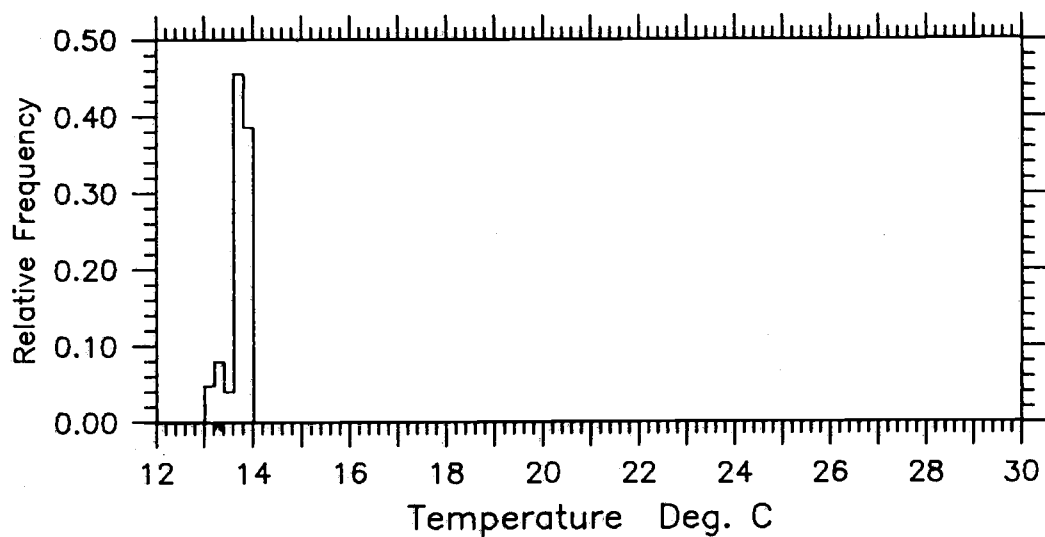
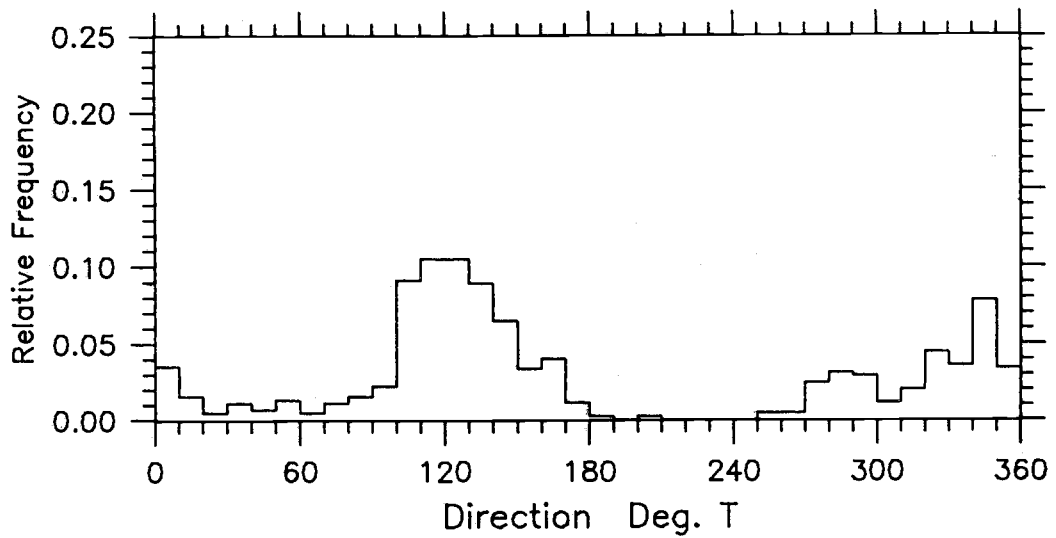
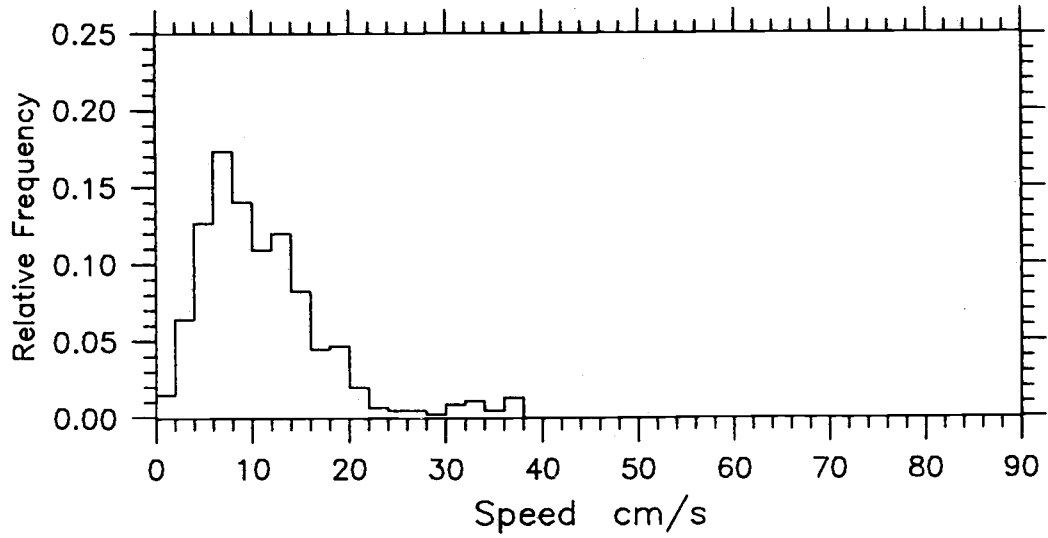
10 South Outer Slope Period VI



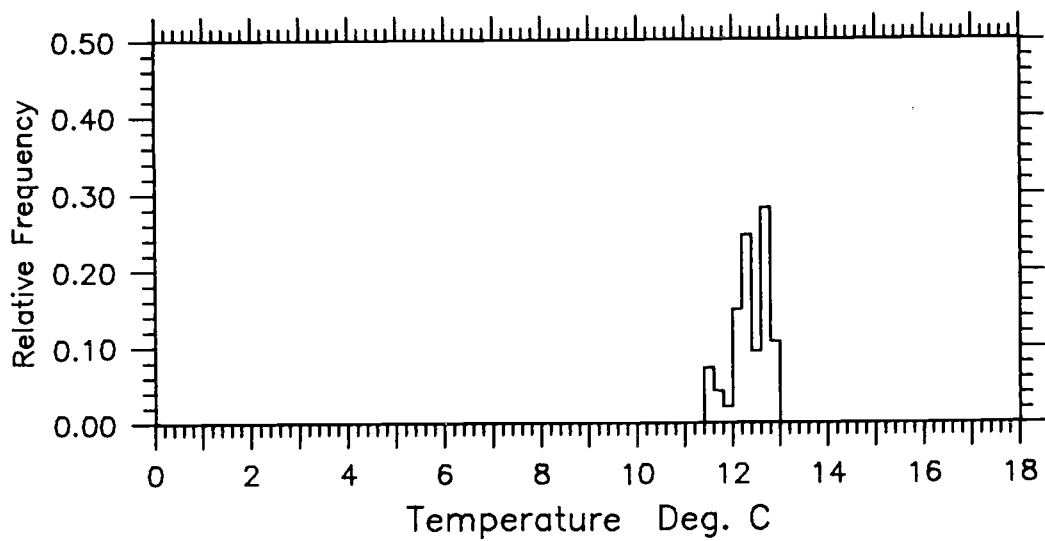
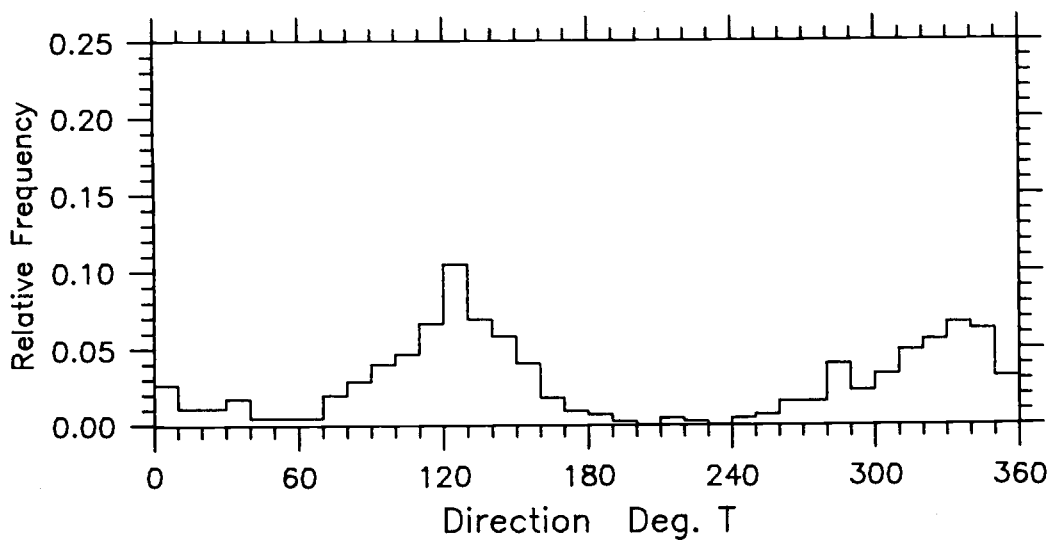
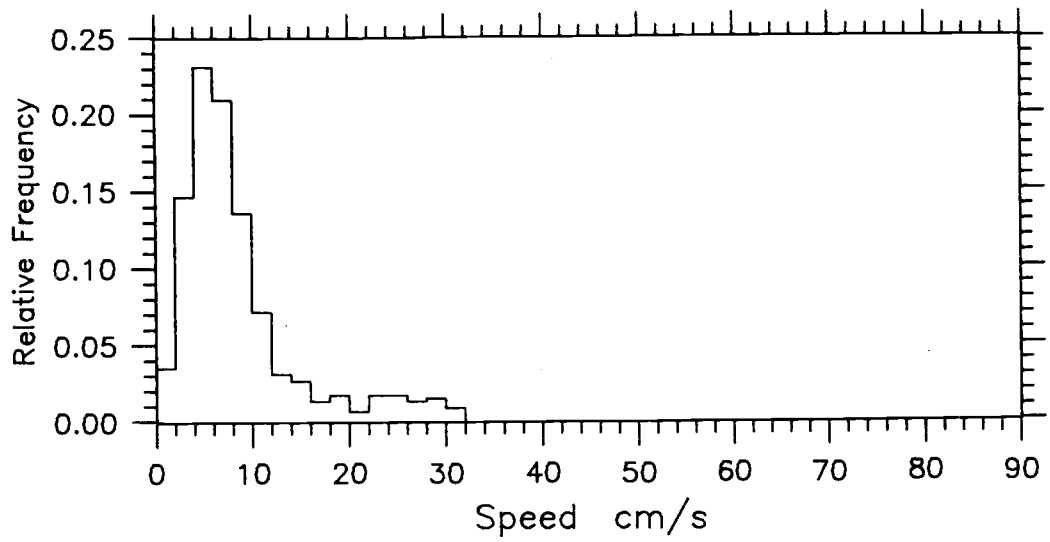
10 South Outer Slope Period VI



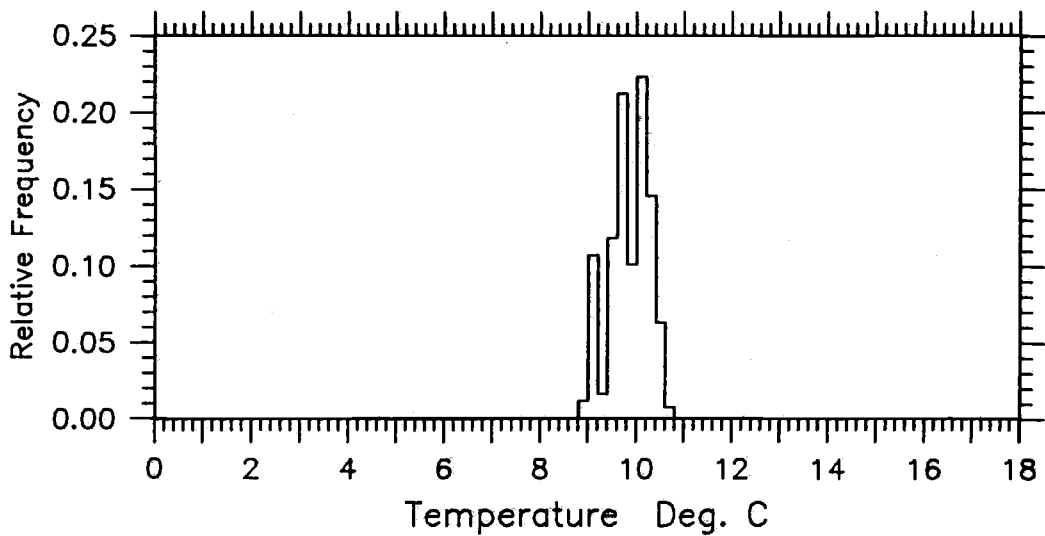
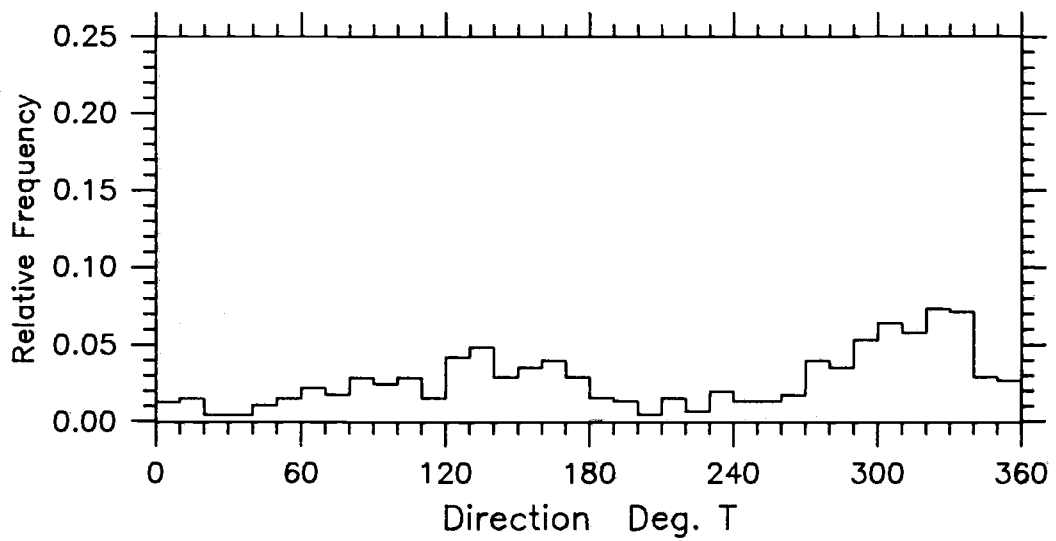
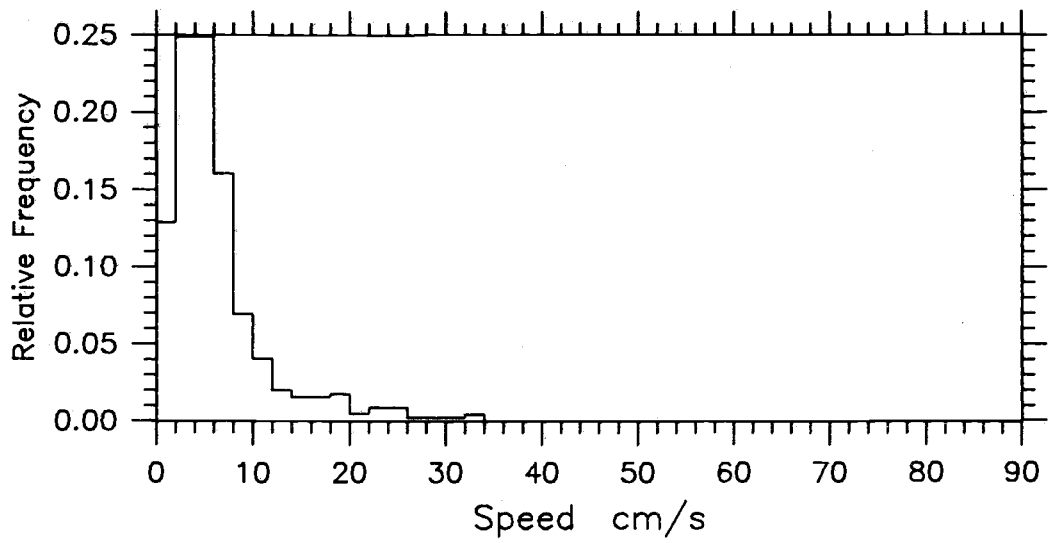
10 South Outer Slope Period I 87m



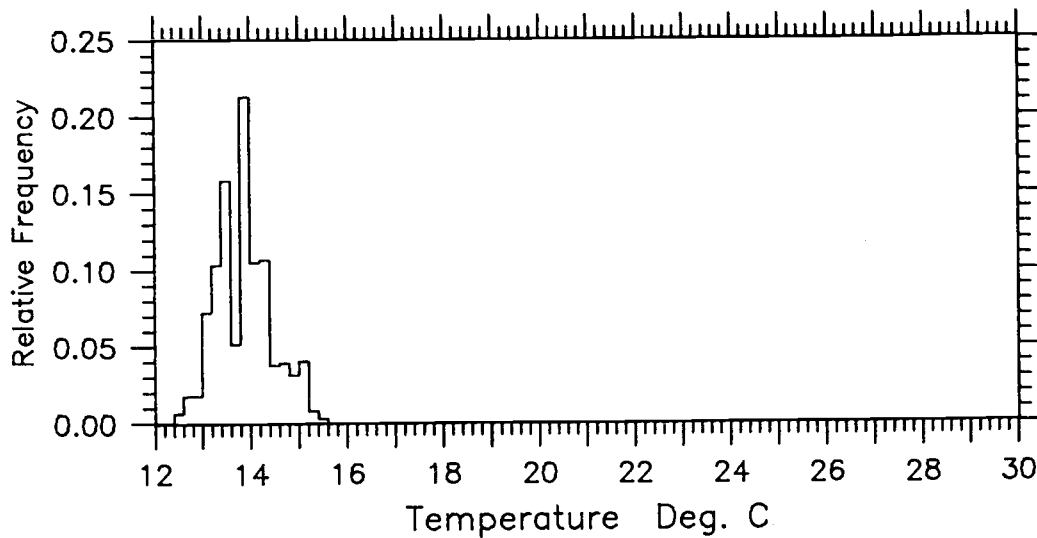
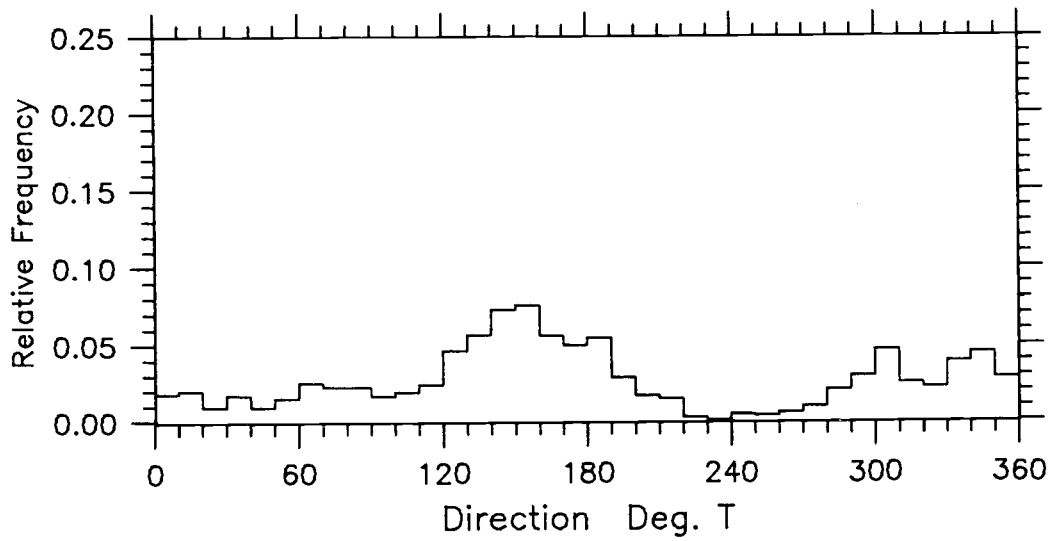
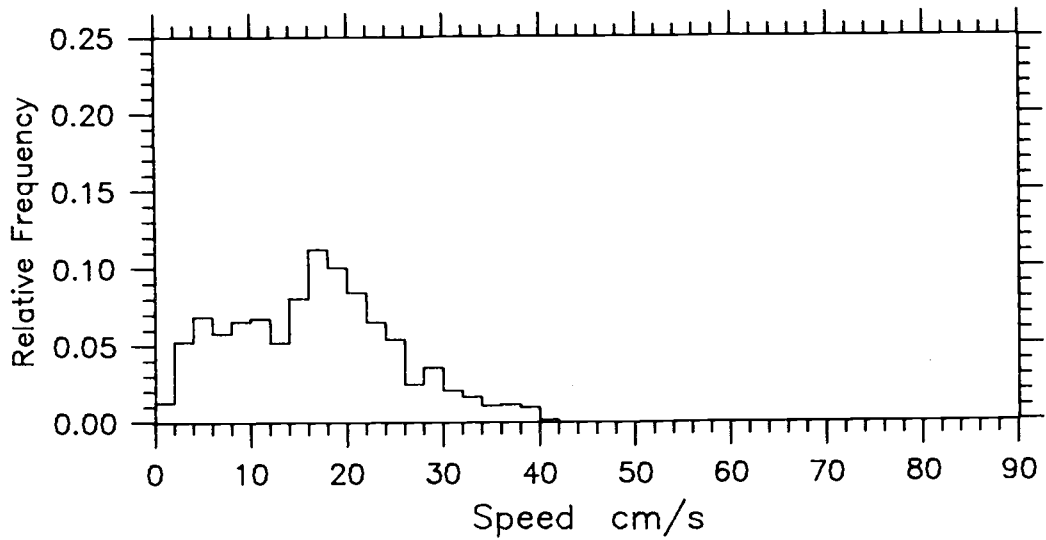
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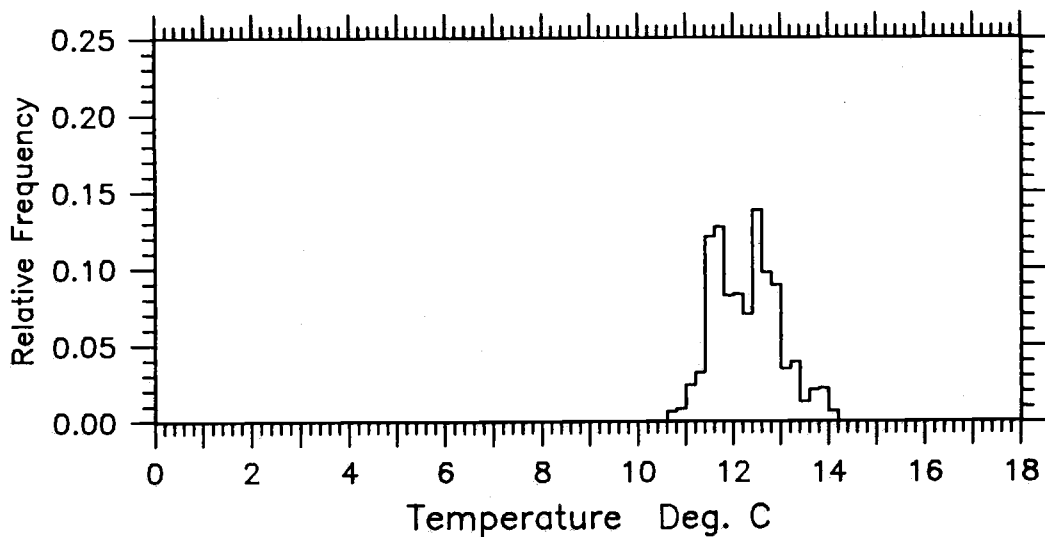
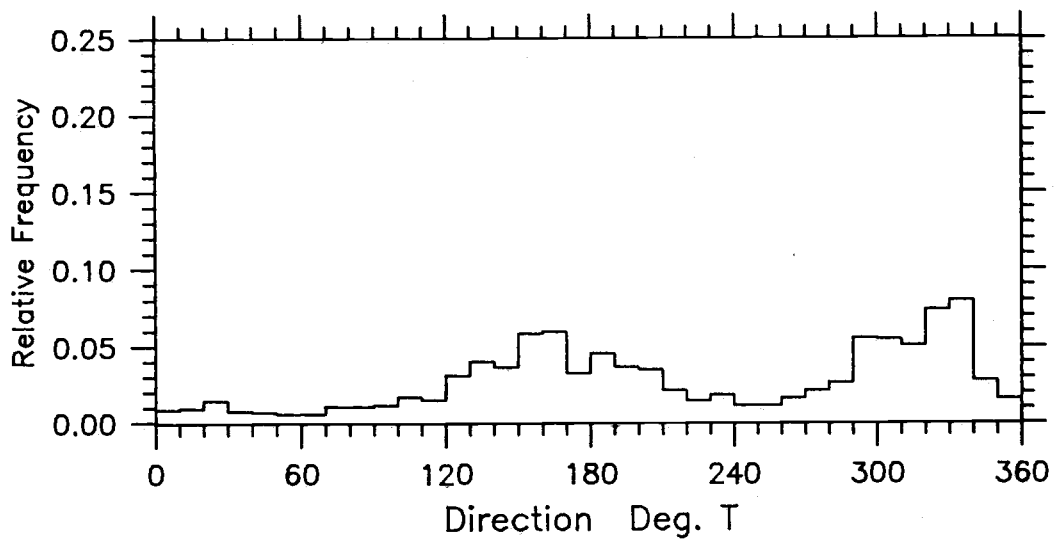
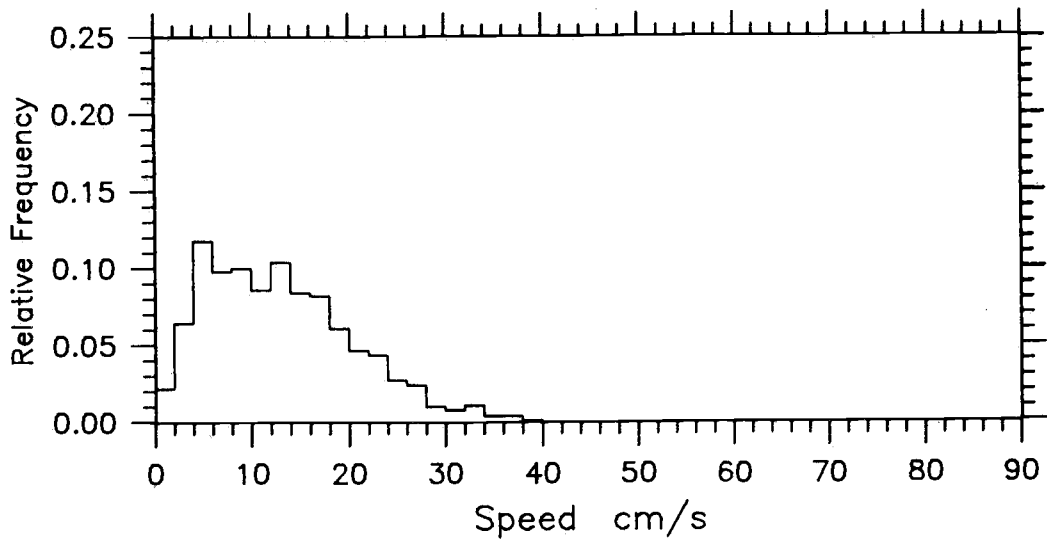
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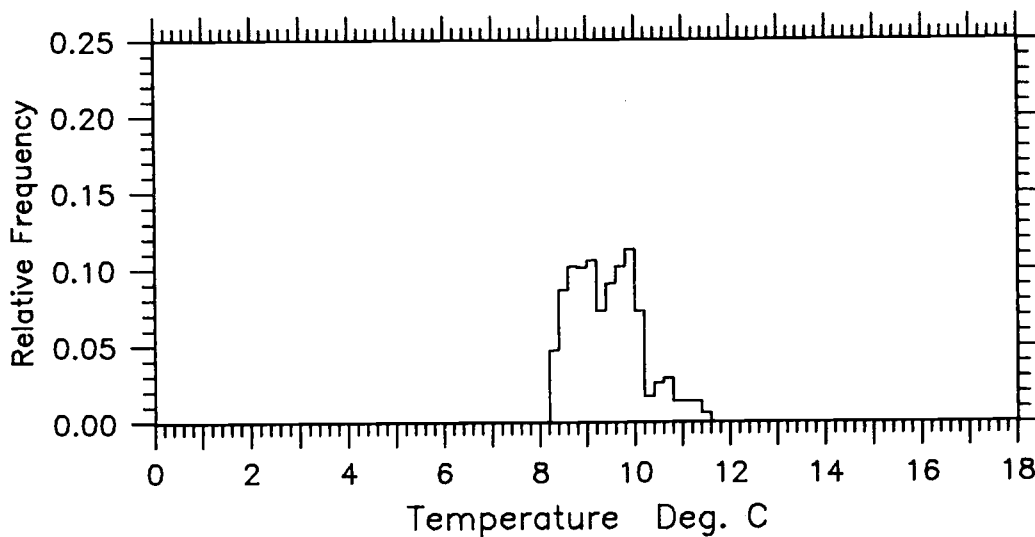
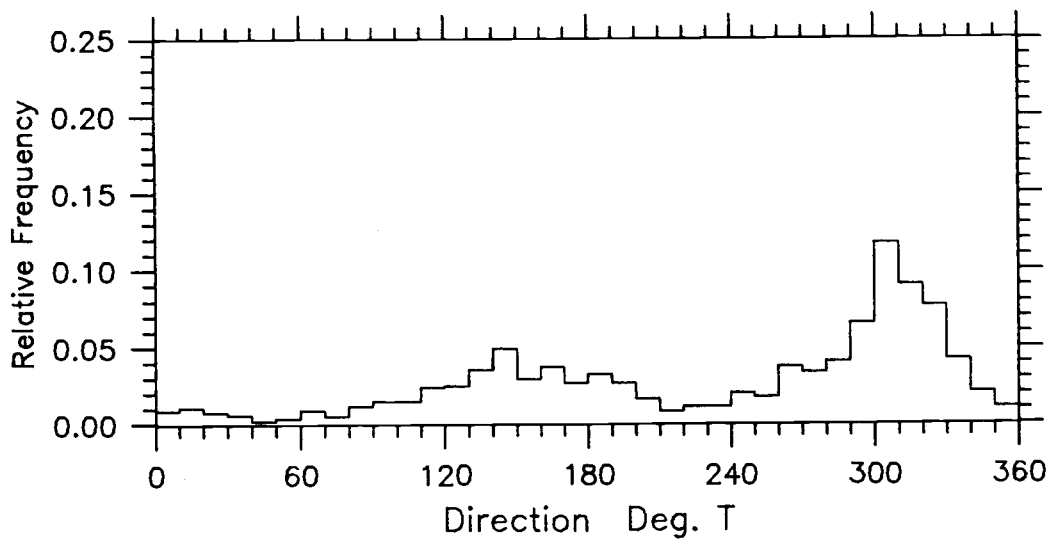
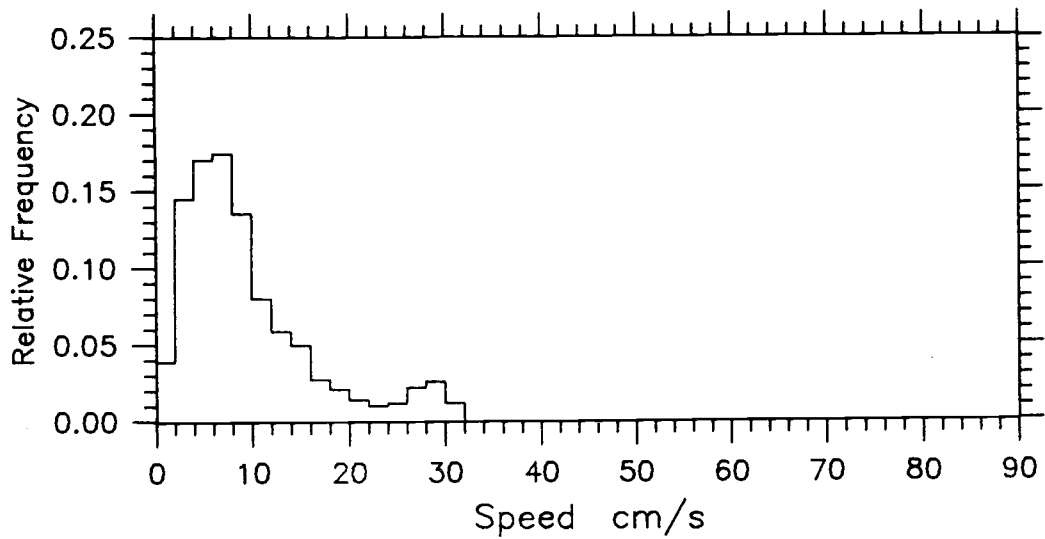
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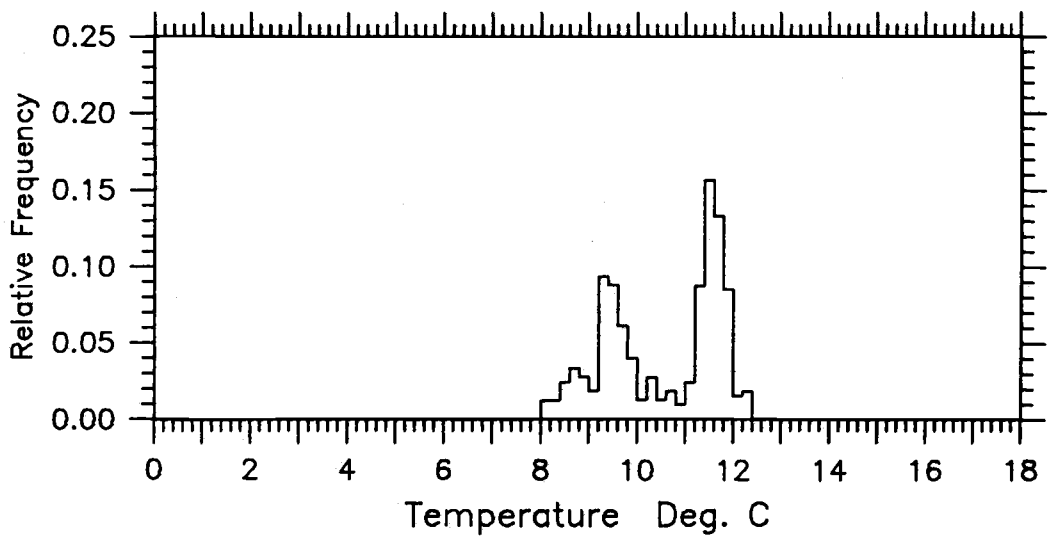
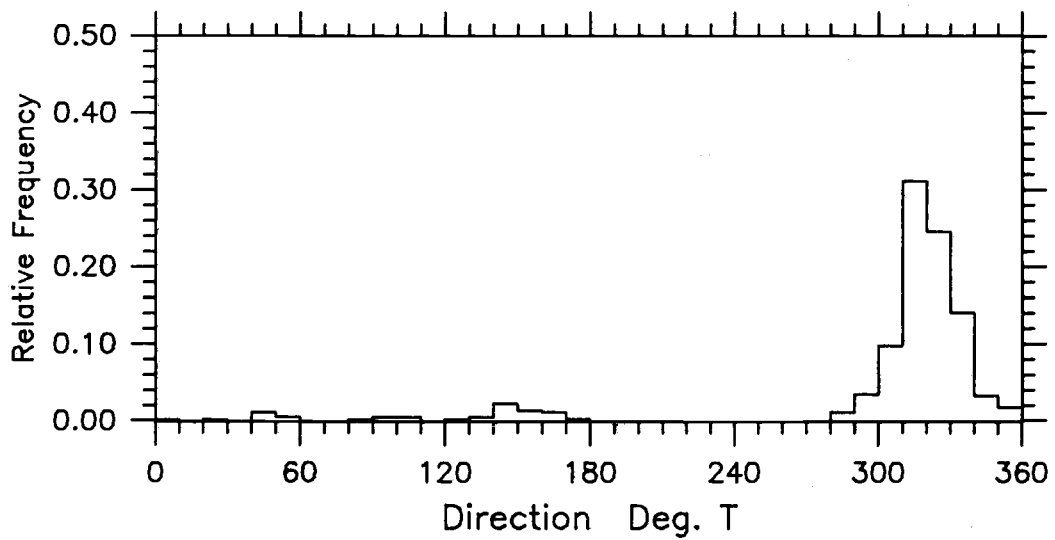
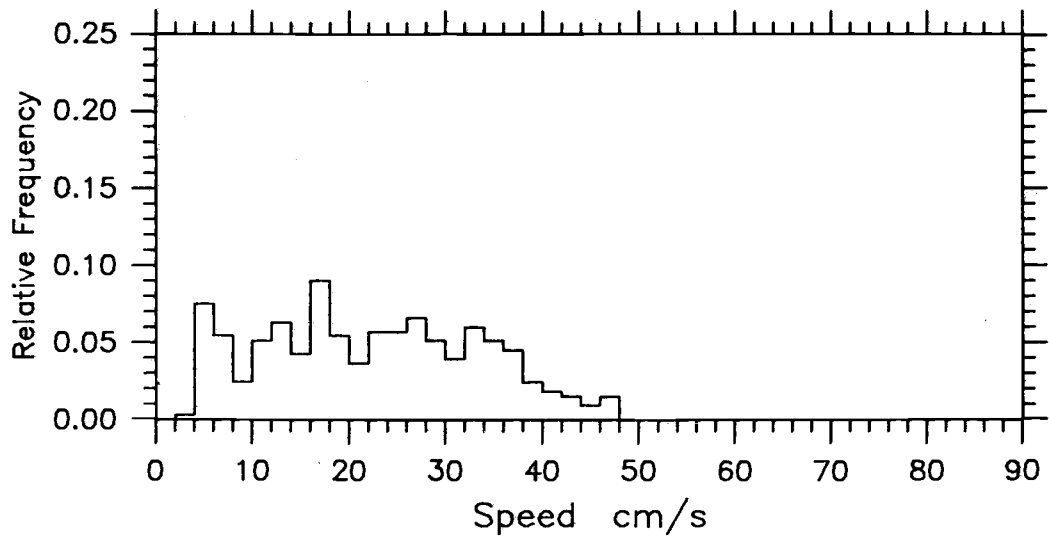
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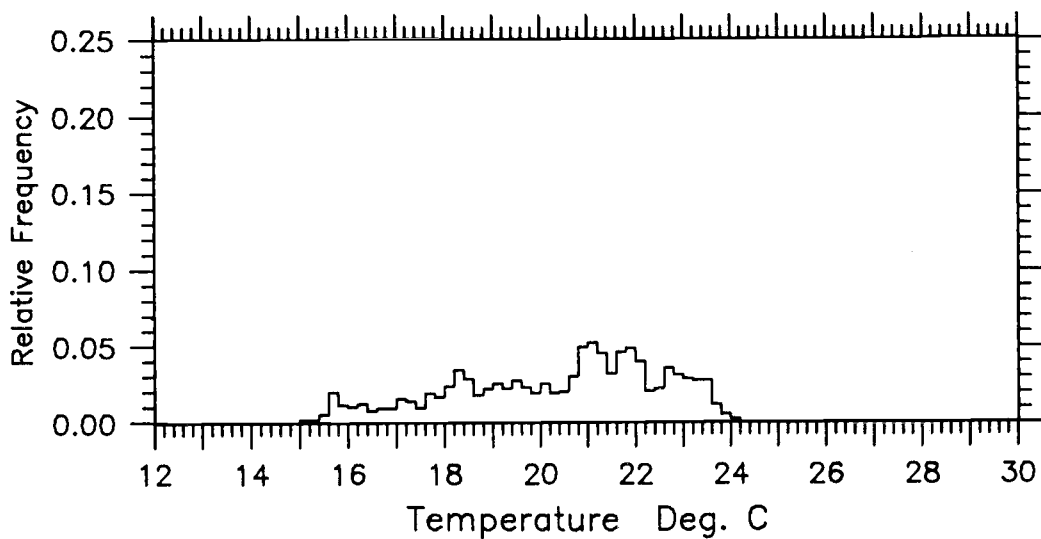
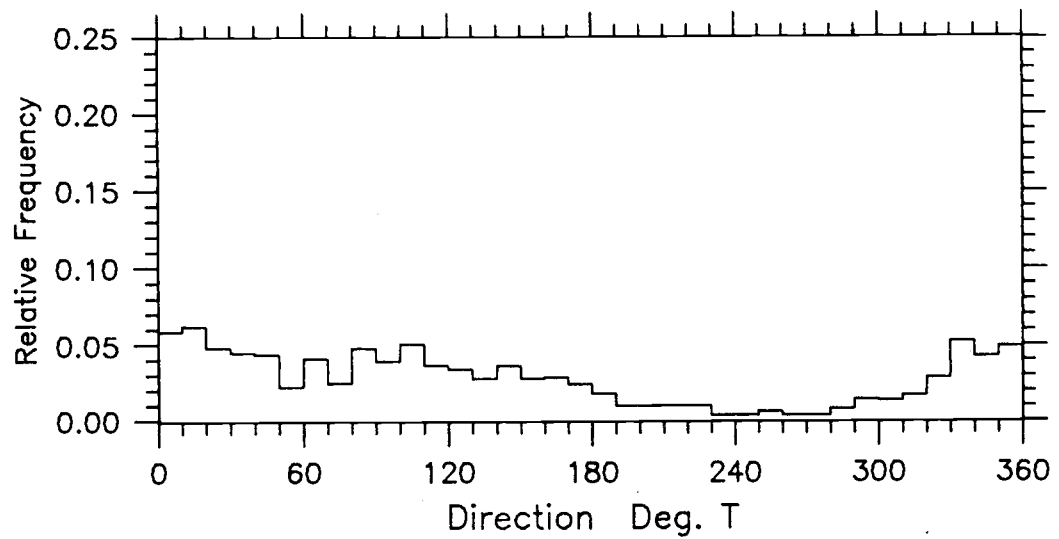
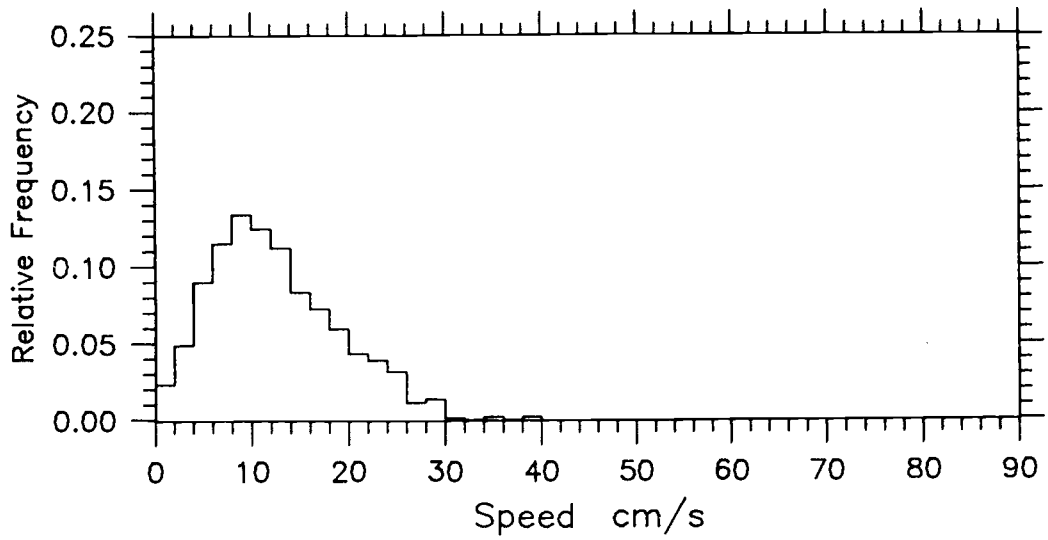
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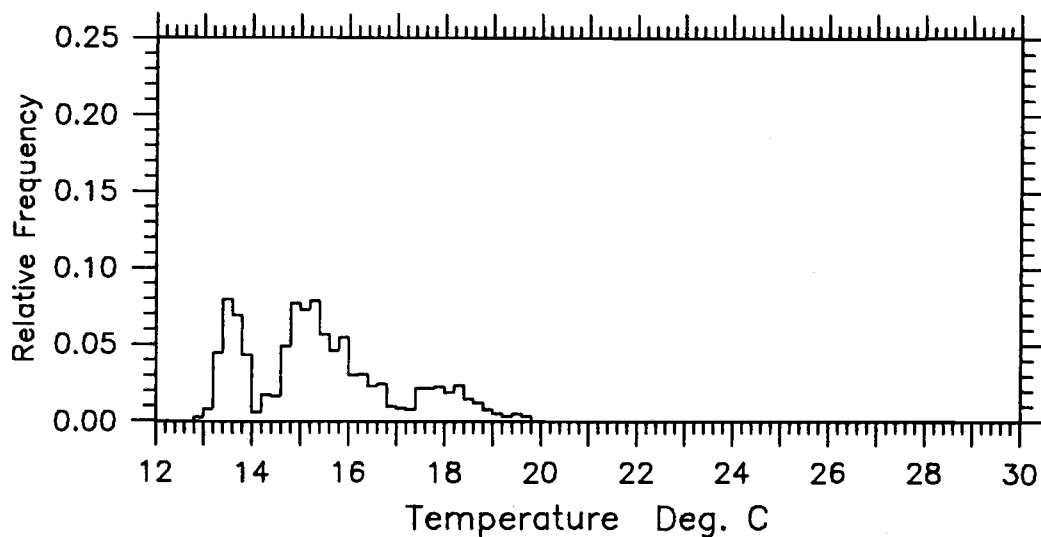
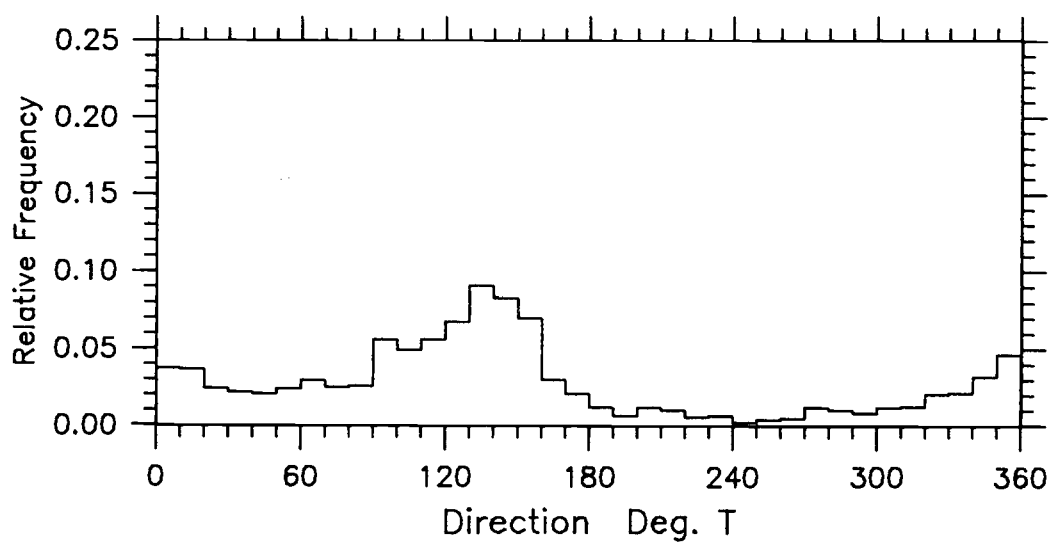
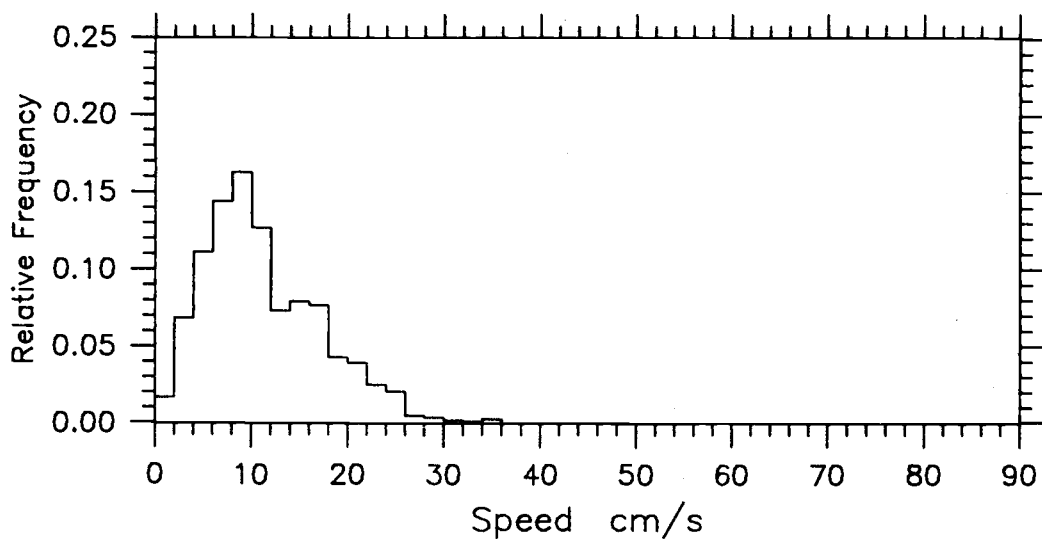
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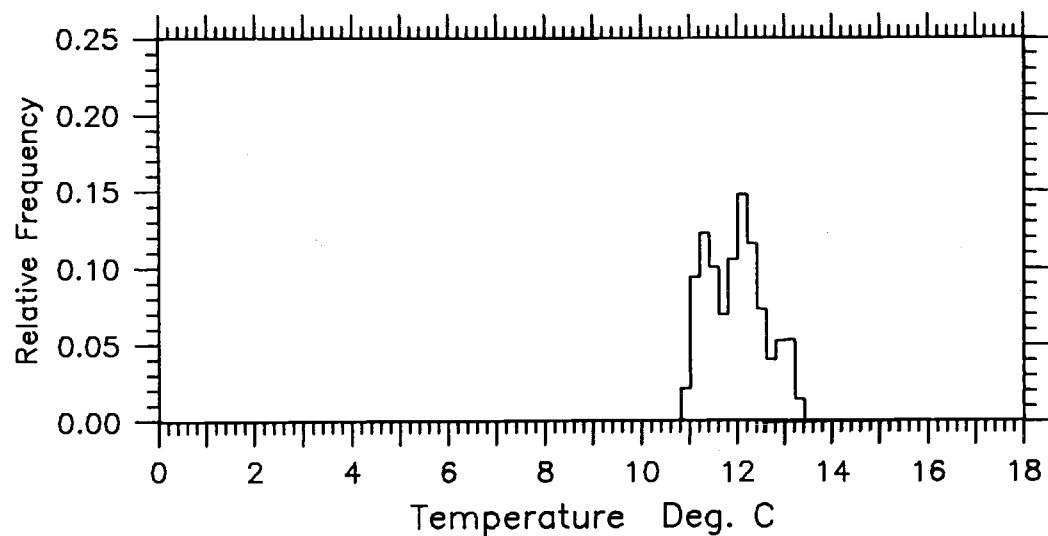
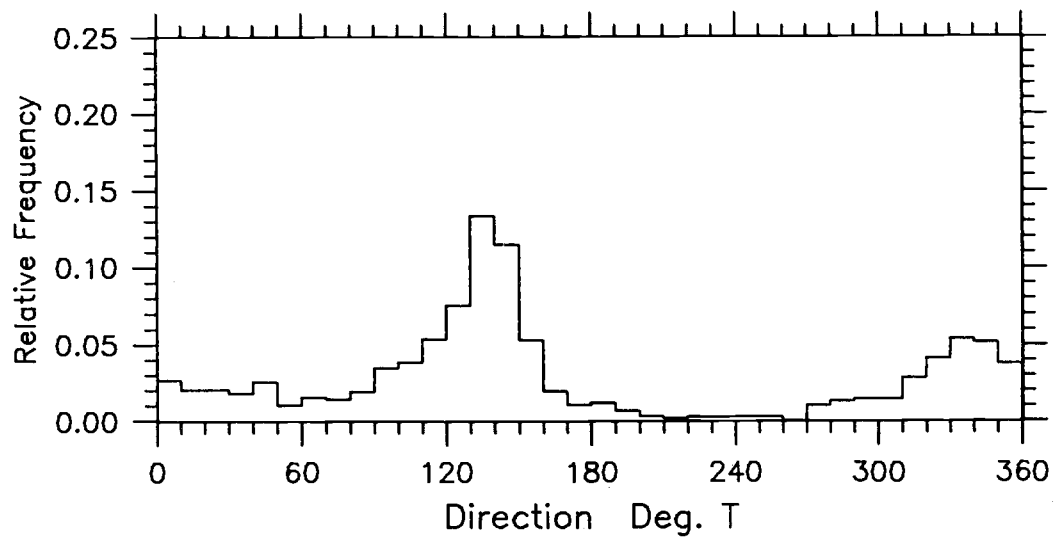
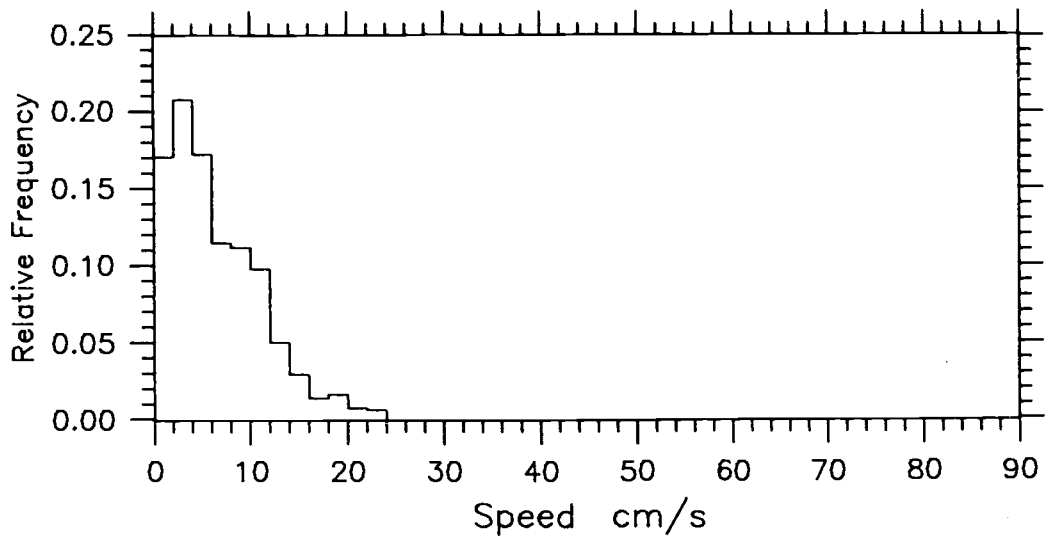
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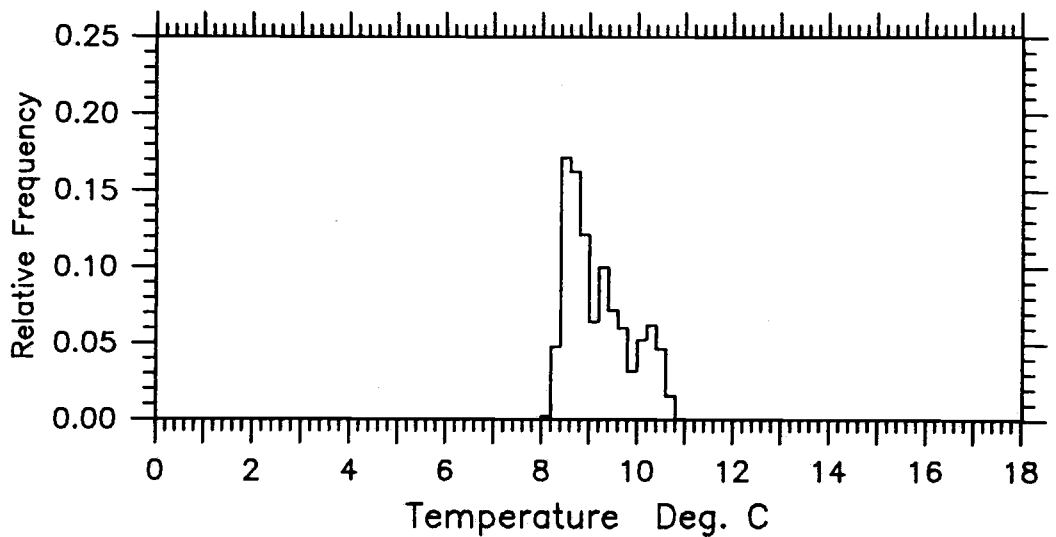
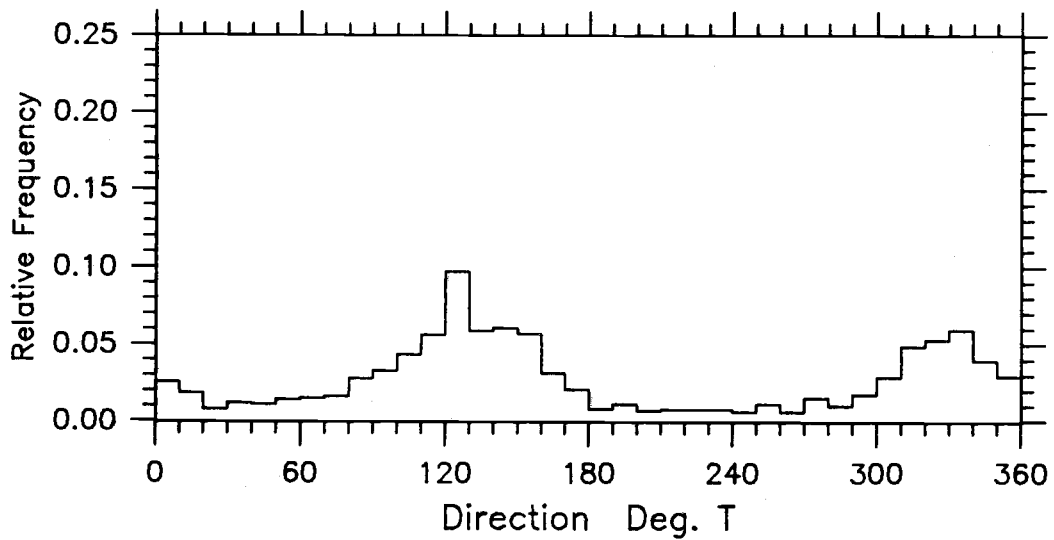
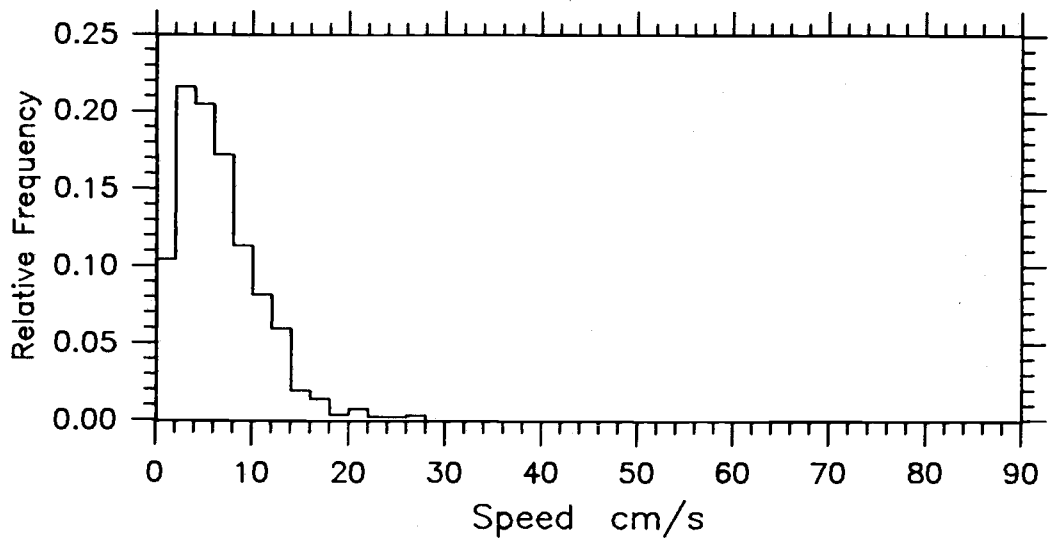
10 South Outer Slope Period IV 90m



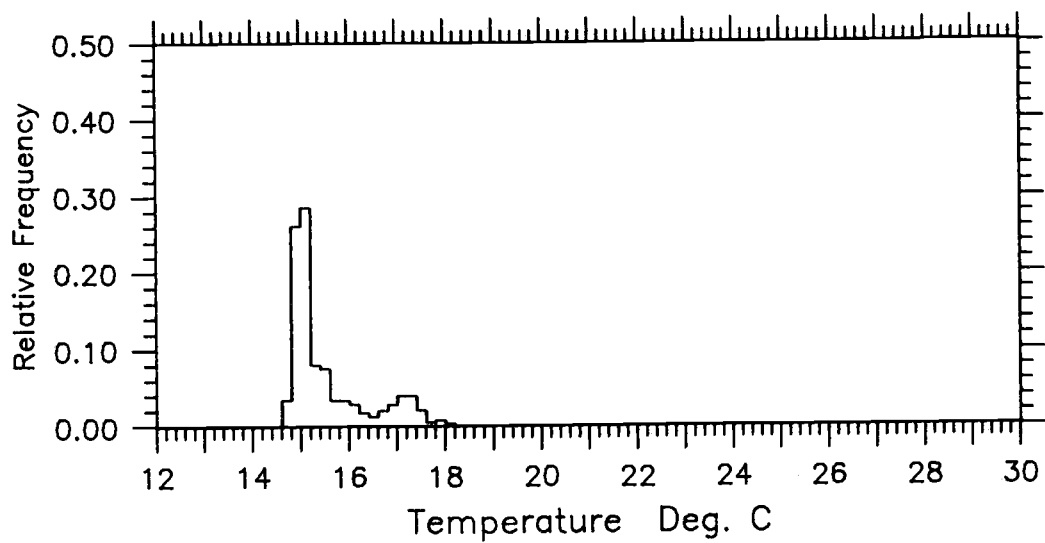
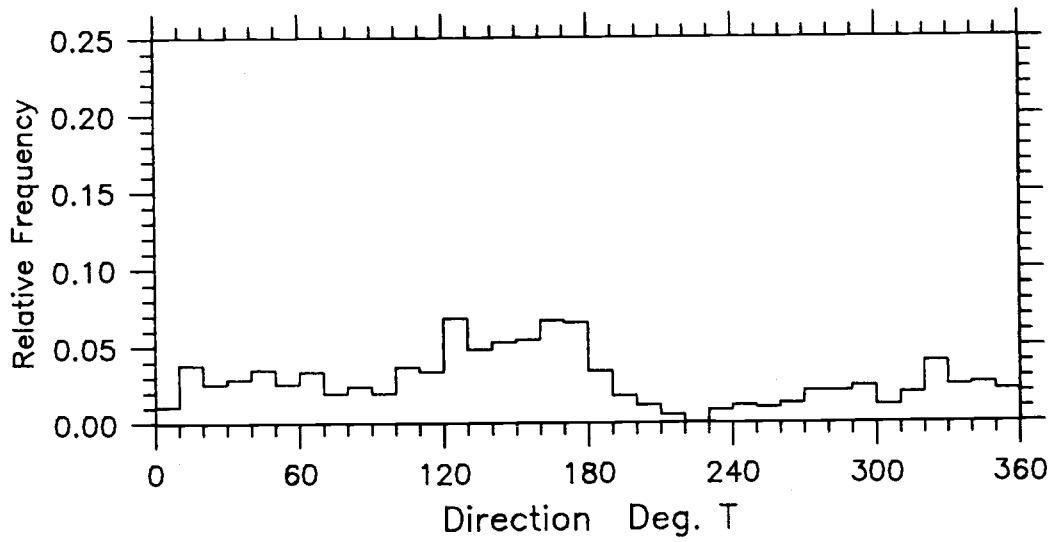
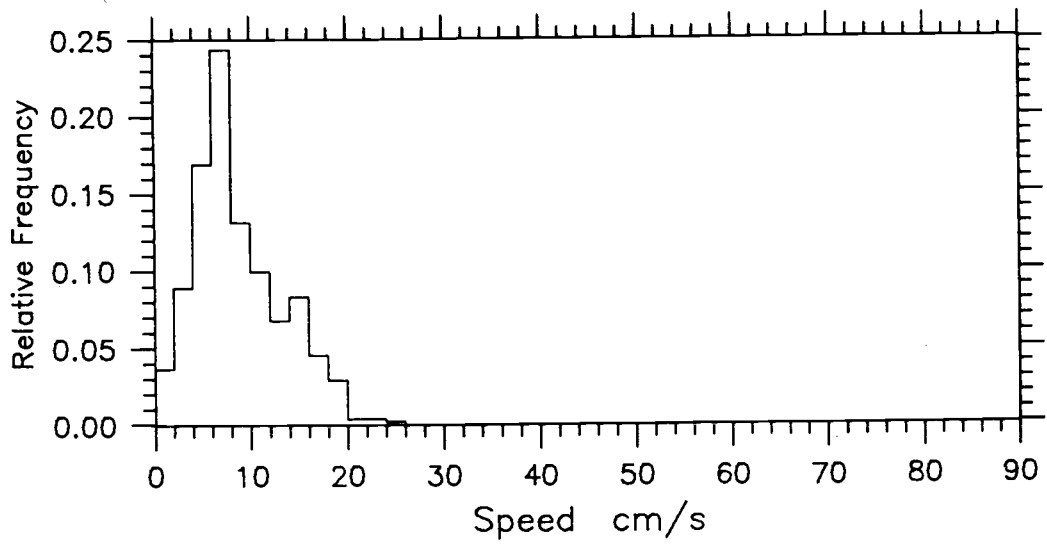
10 South Outer Slope Period IV 140m



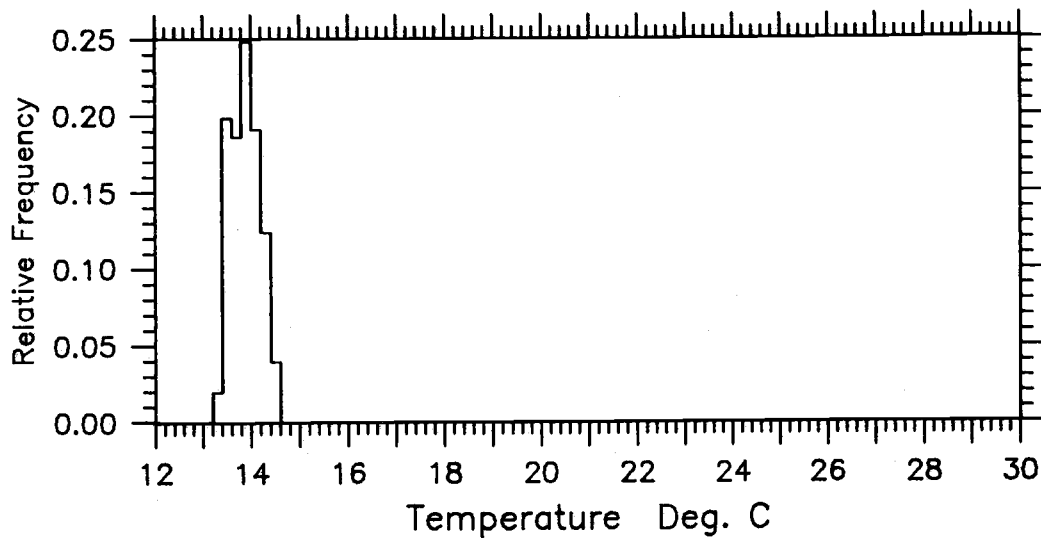
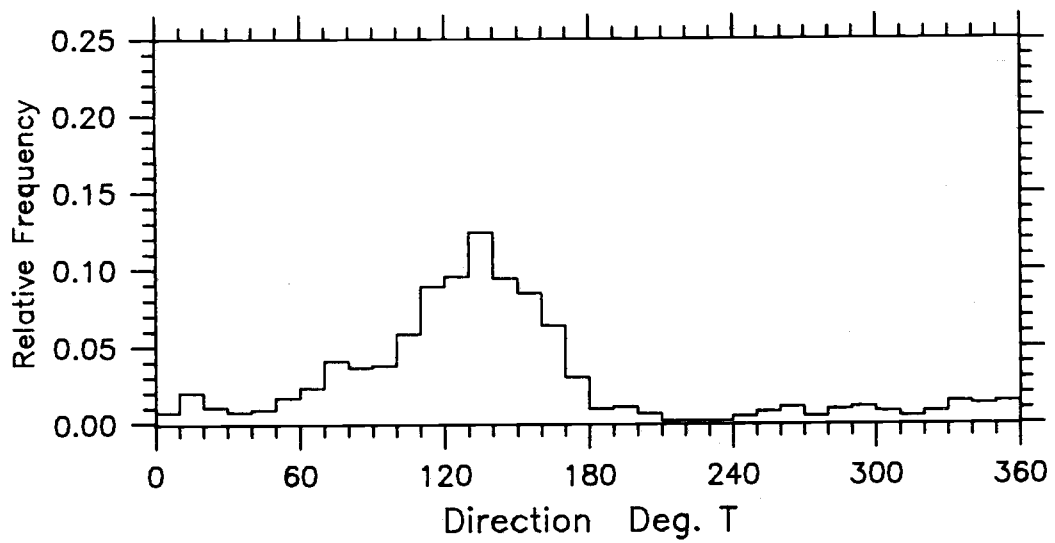
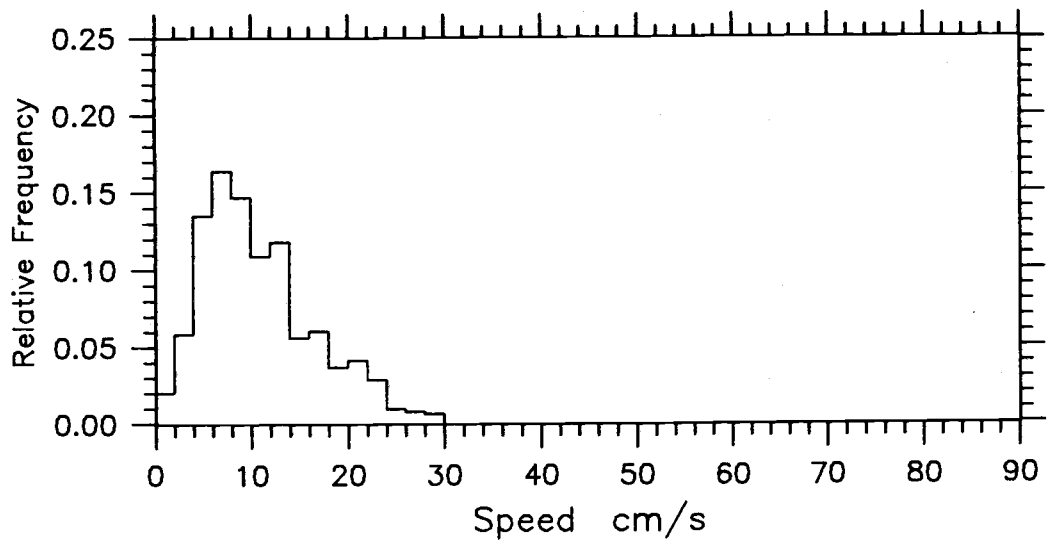
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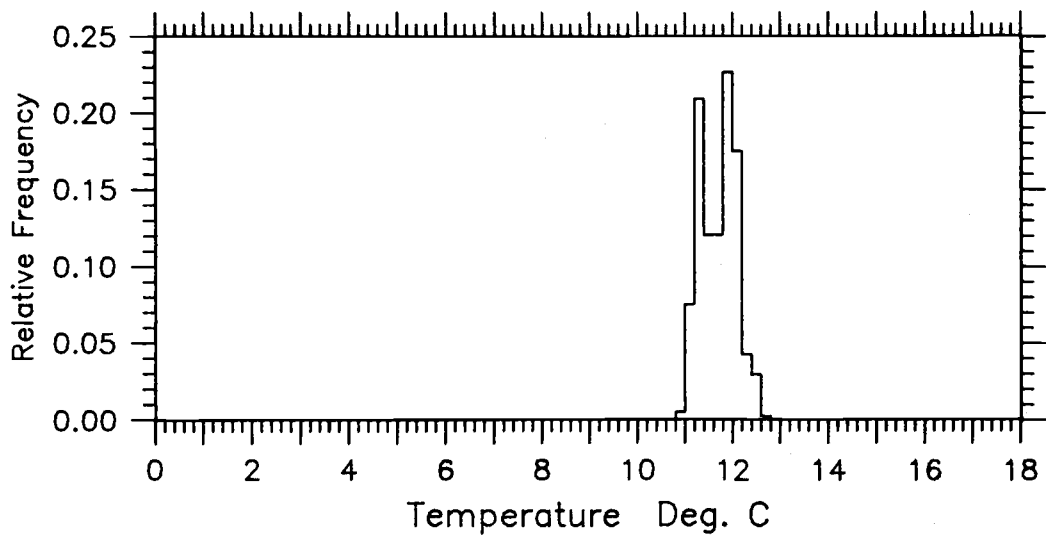
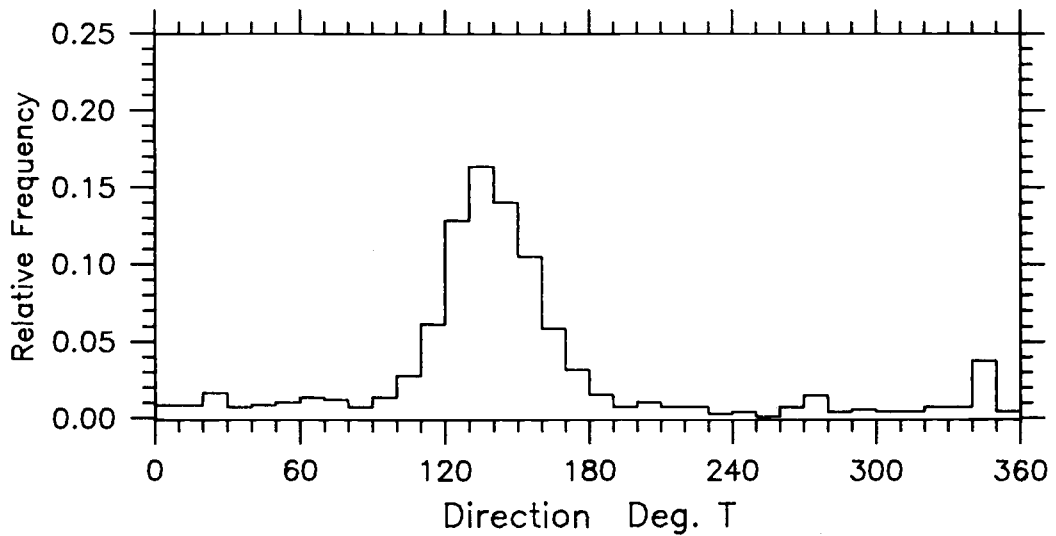
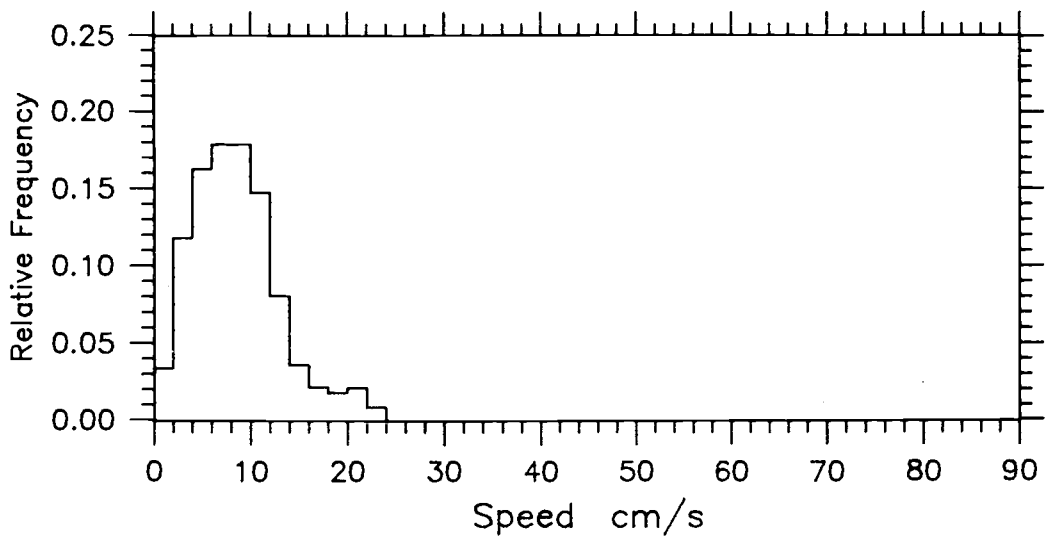
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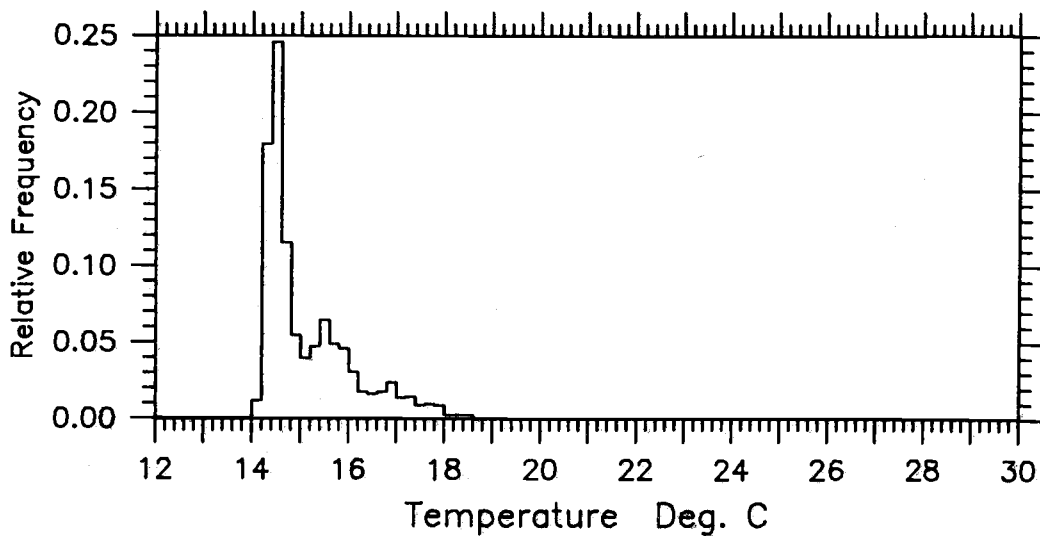
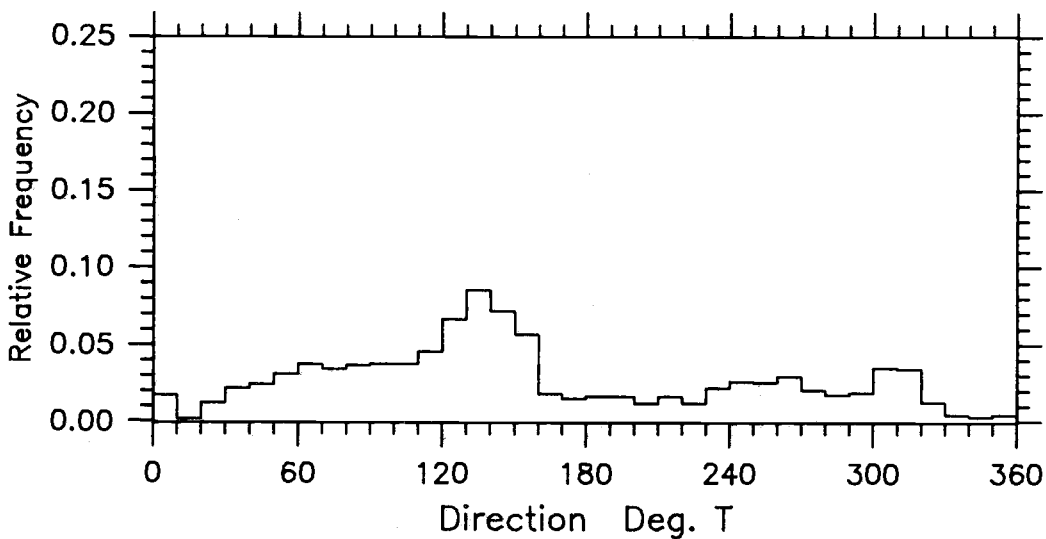
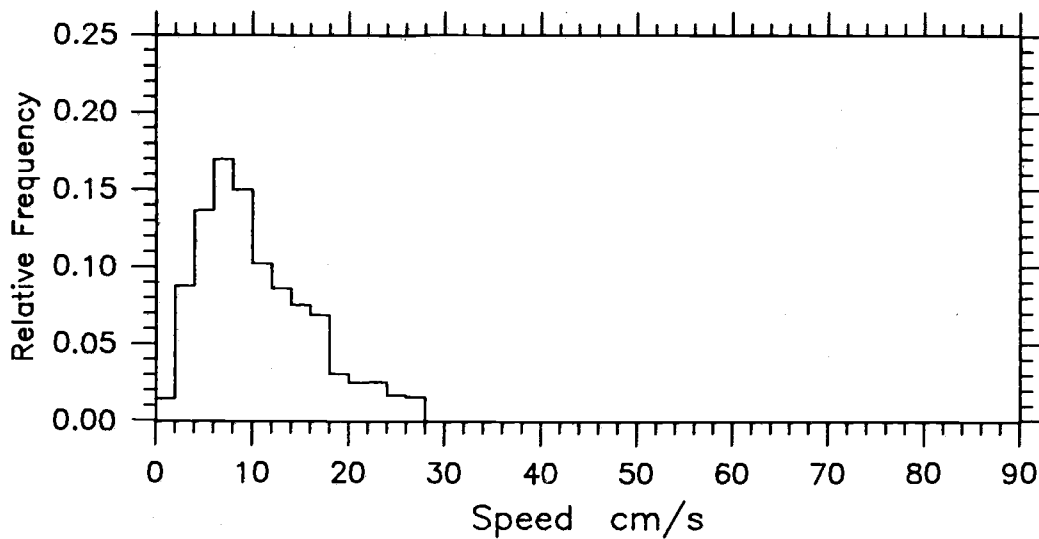
10 South Outer Slope Period V 84m



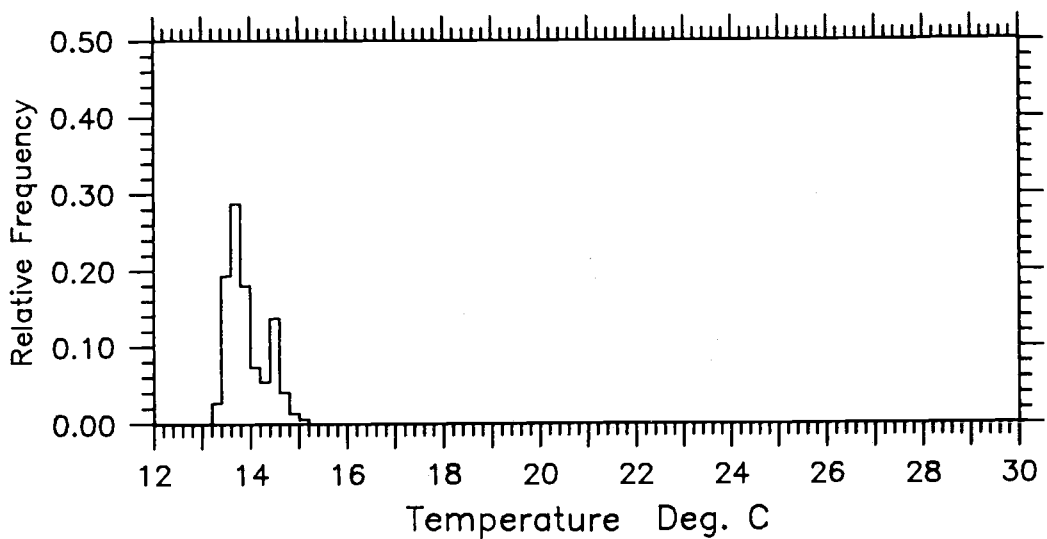
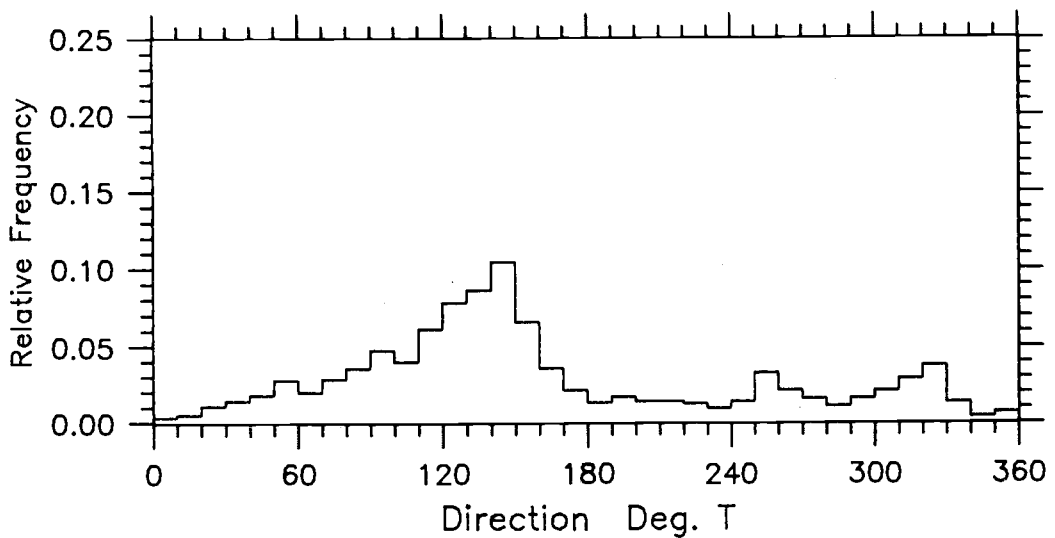
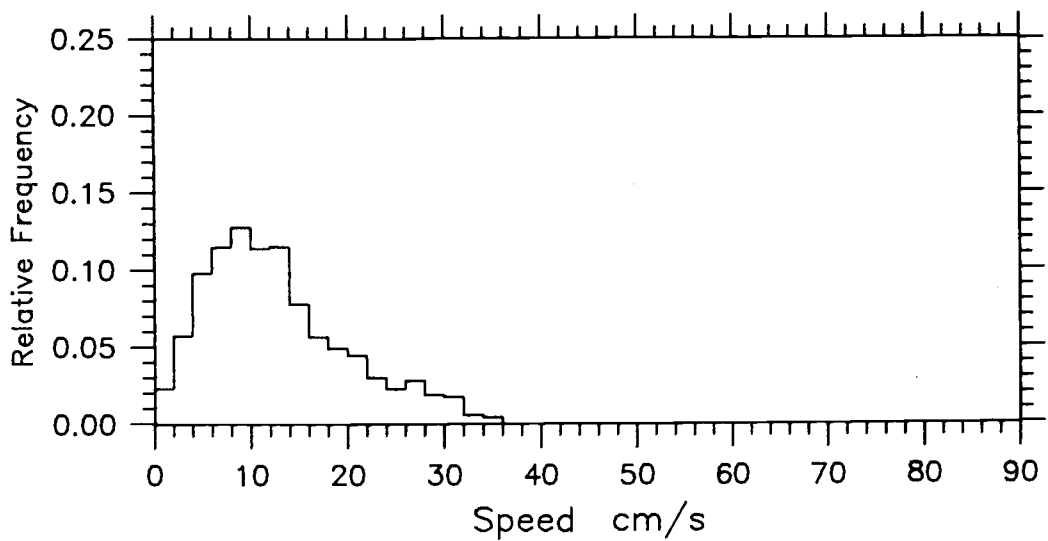
10 South Outer Slope Period V 134m



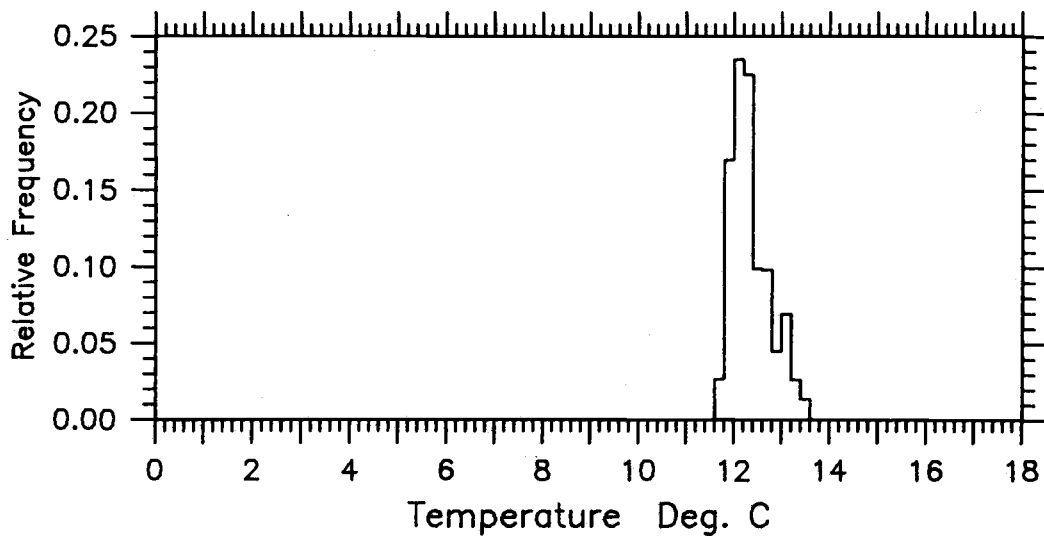
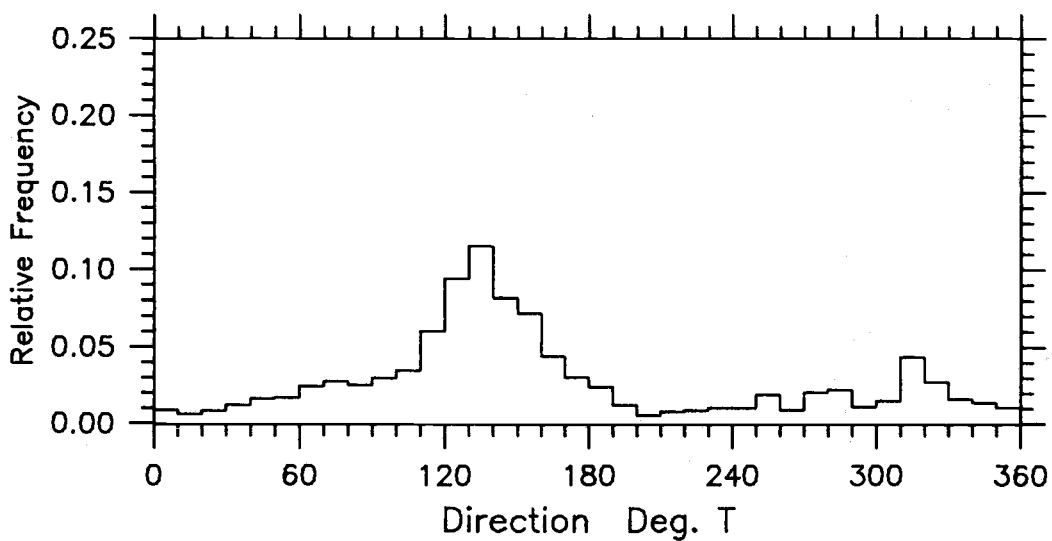
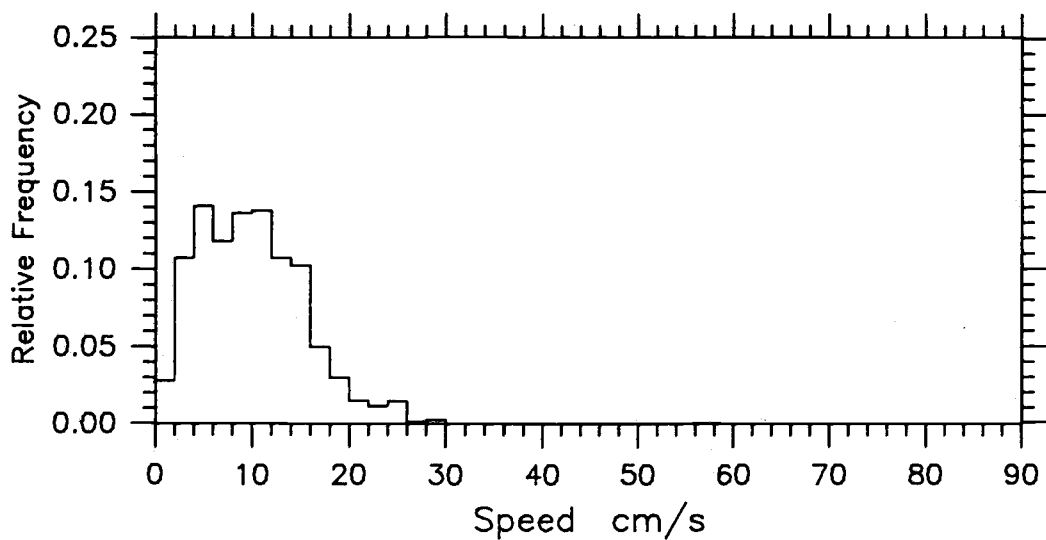
10 South Outer Slope Period V 279m



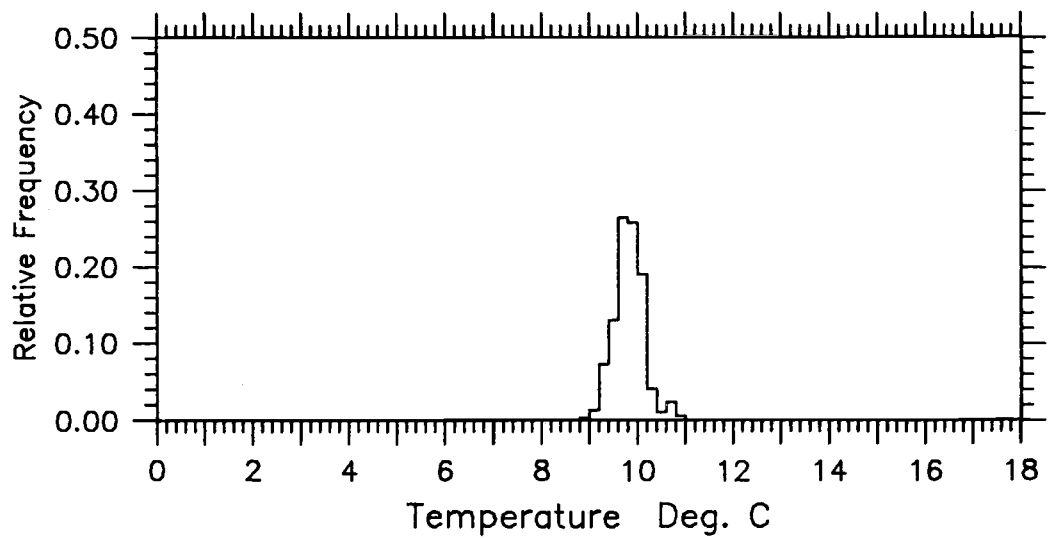
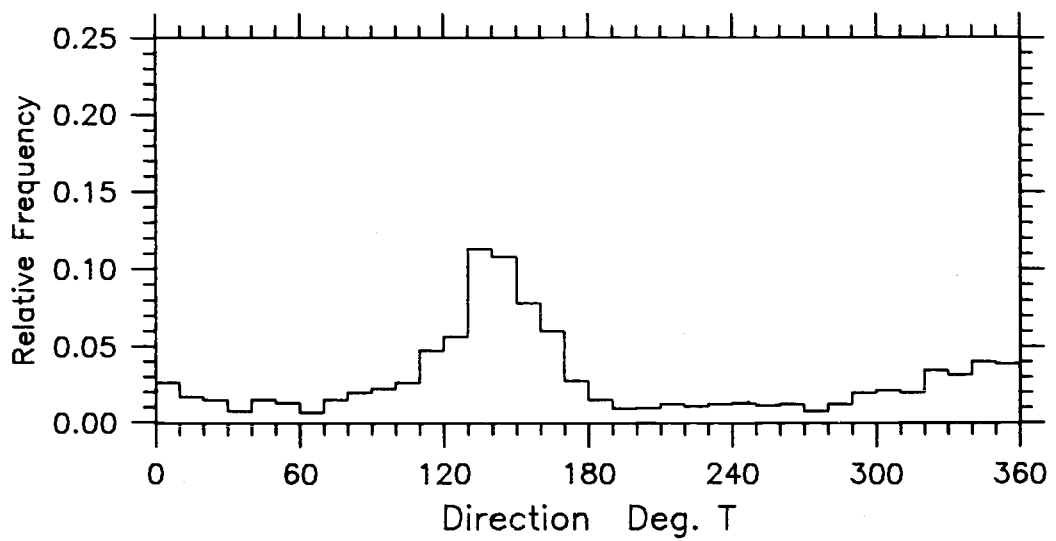
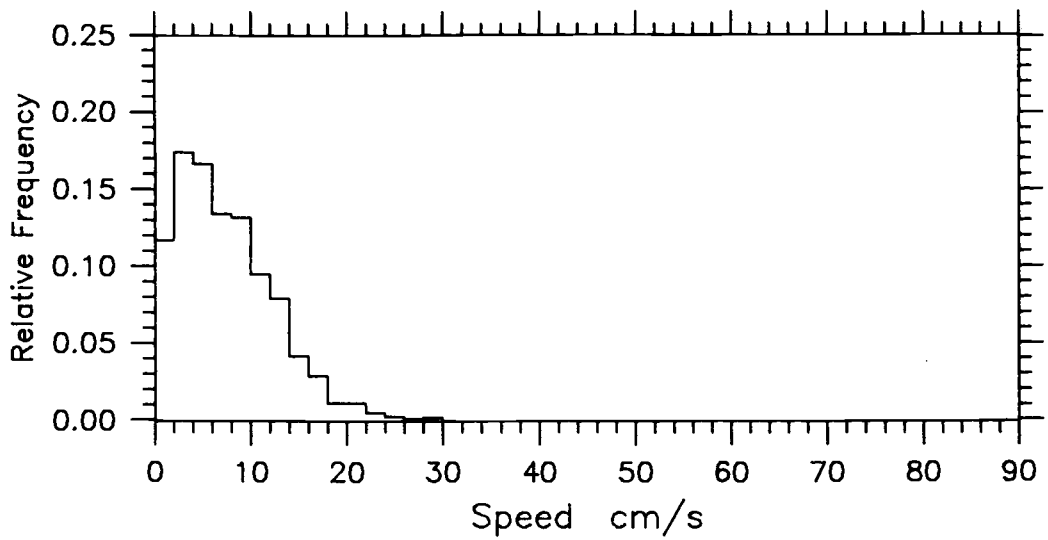
10 South Outer Slope Period VI 79m



10 South Outer Slope Period VI 130m



10 South Outer Slope Period VI 250m

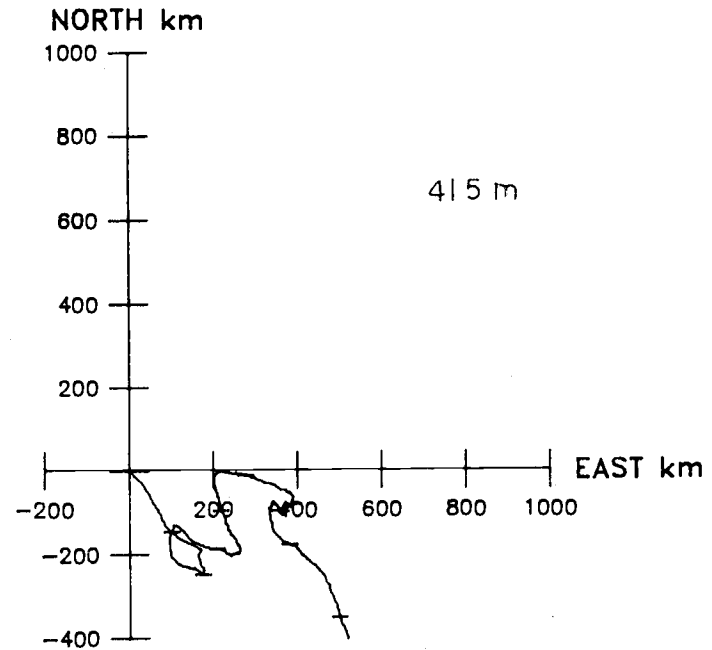
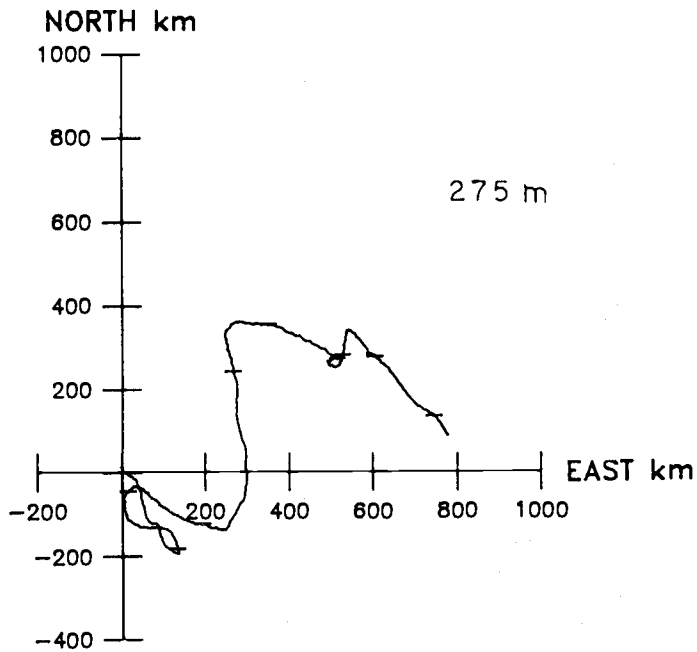
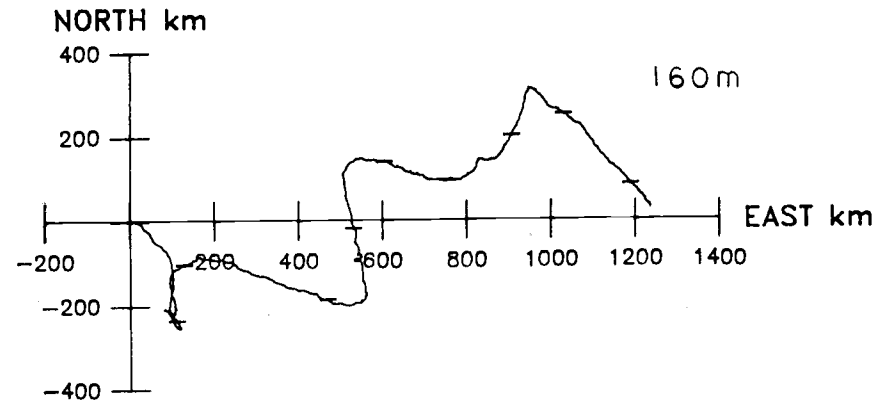
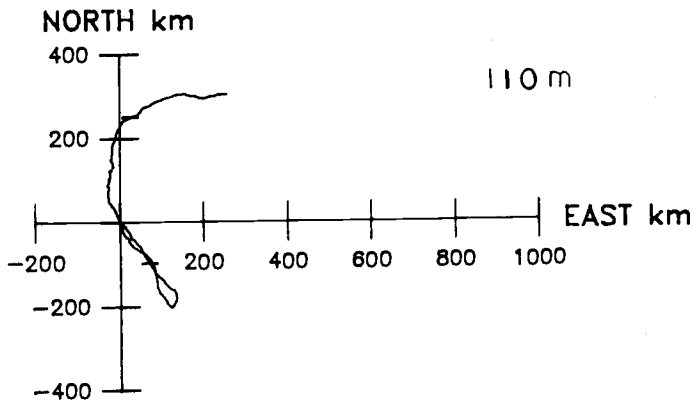


10 South Outer Slope Period VI 400m

MOORING 10 SOUTH OFFSHORE

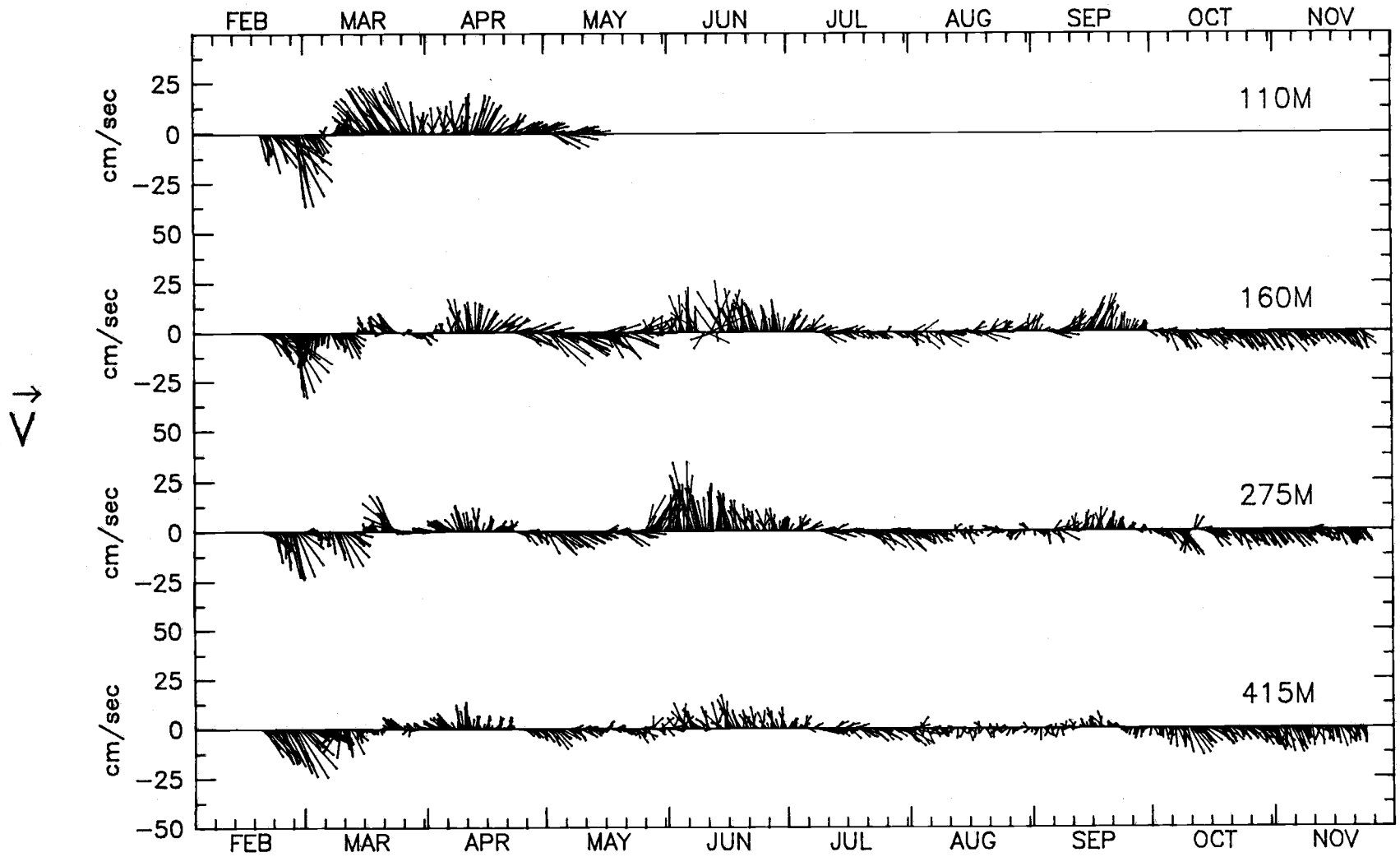
MOORING 10 South Offshore

PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U, V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T [Deg.C]	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
IV	110	336	1118	3.5 (9.3)	4.2 (11.9)	20.53 (2.27)	14.28	23.69	5.4	40.2	-33.4
	160	1118	1118	5.1 (6.1)	0.1 (8.4)	15.48 (1.53)	13.02	19.73	5.1	88.7	-25.0
	275	1118	1118	3.2 (5.4)	0.4 (8.4)	11.89 (0.62)	9.53	13.29	3.2	83.7	-22.2
	415	1118	1118	2.1 (4.9)	-1.7 (6.1)	9.11 (0.64)	7.42	10.76	2.7	127.9	-34.5



10 South Offshore Period IV

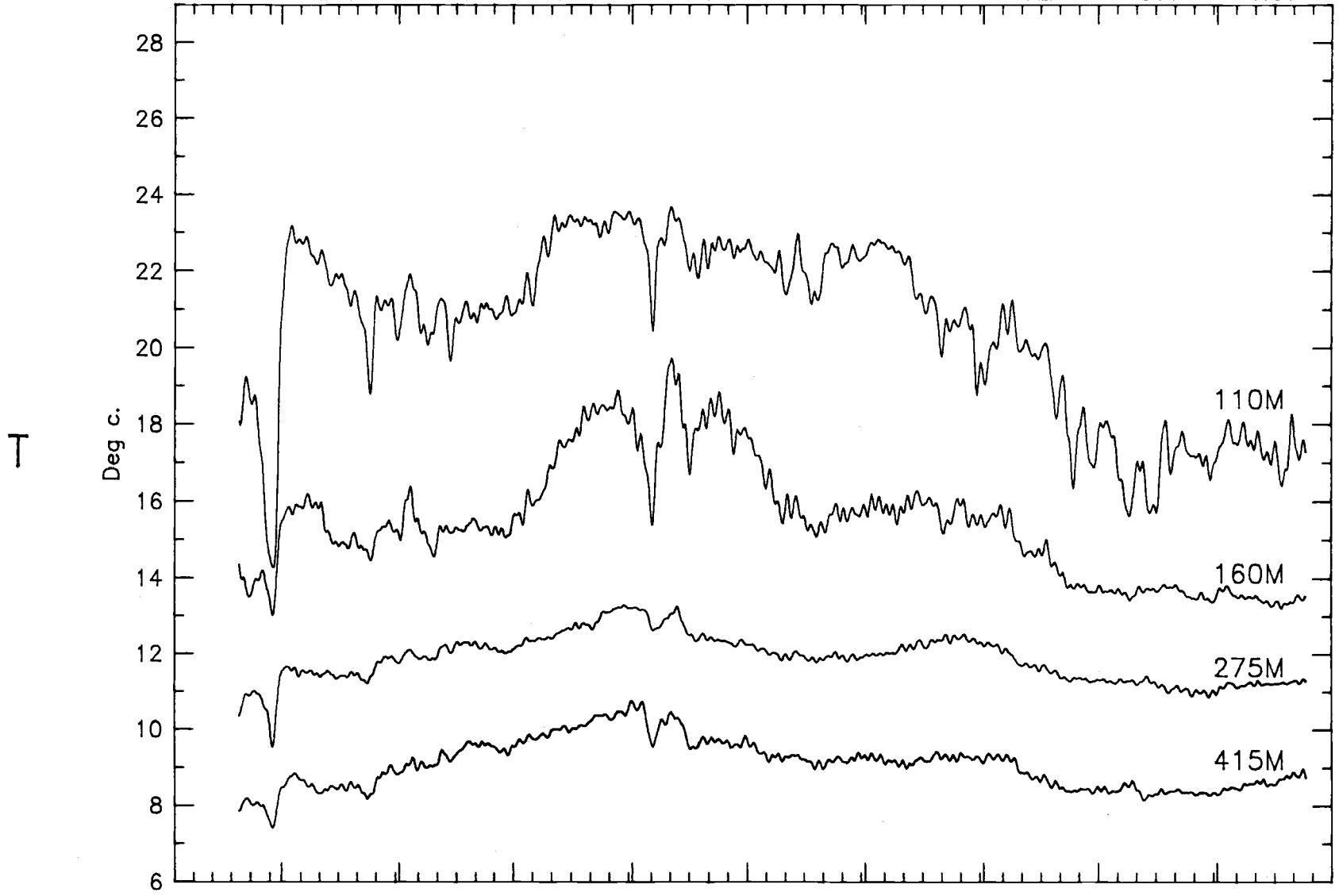
1983



10 South Offshore Period IV

1983

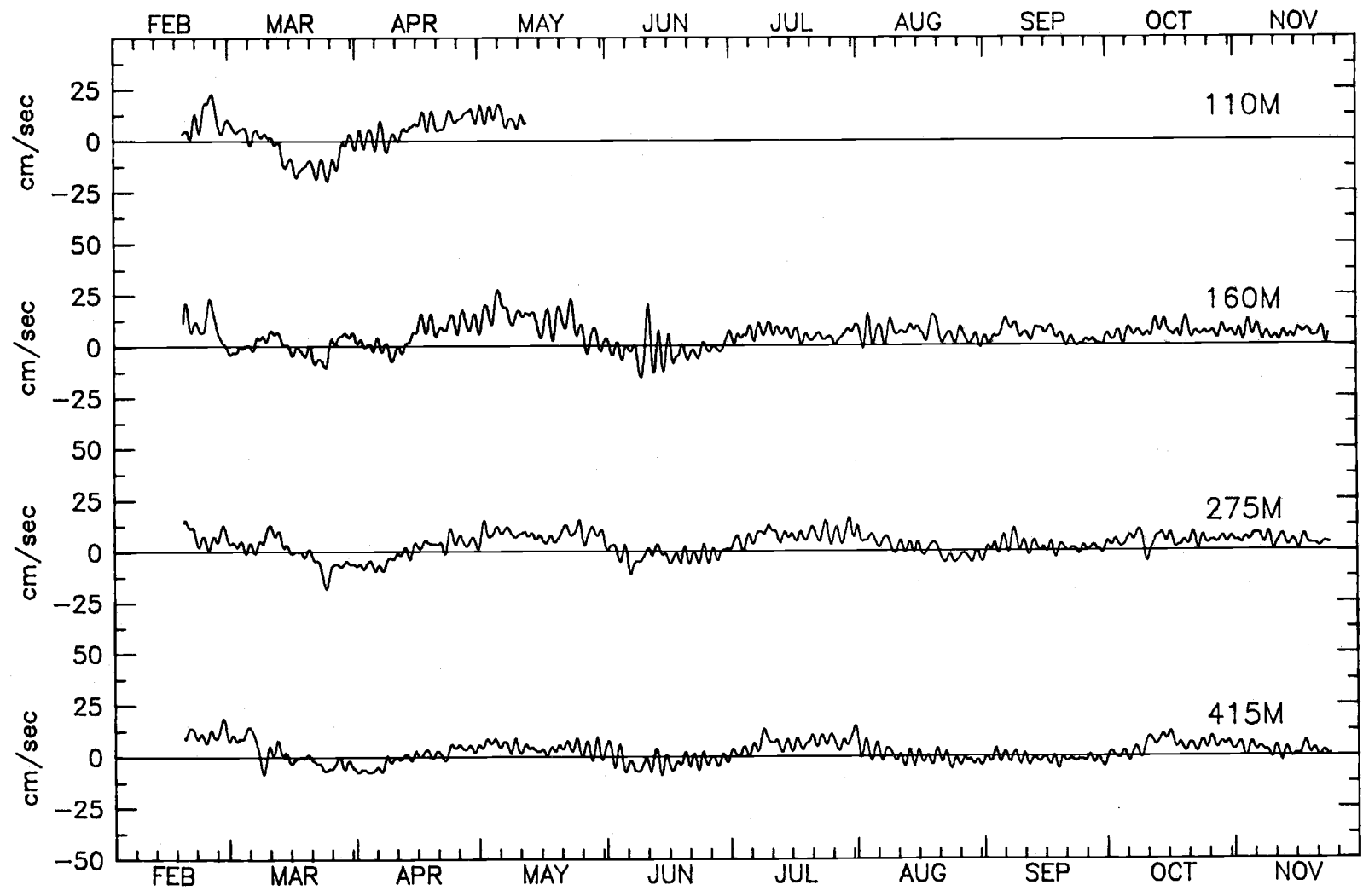
FEB MAR APR MAY JUN JUL AUG SEP OCT NOV



10 South Offshore Period IV

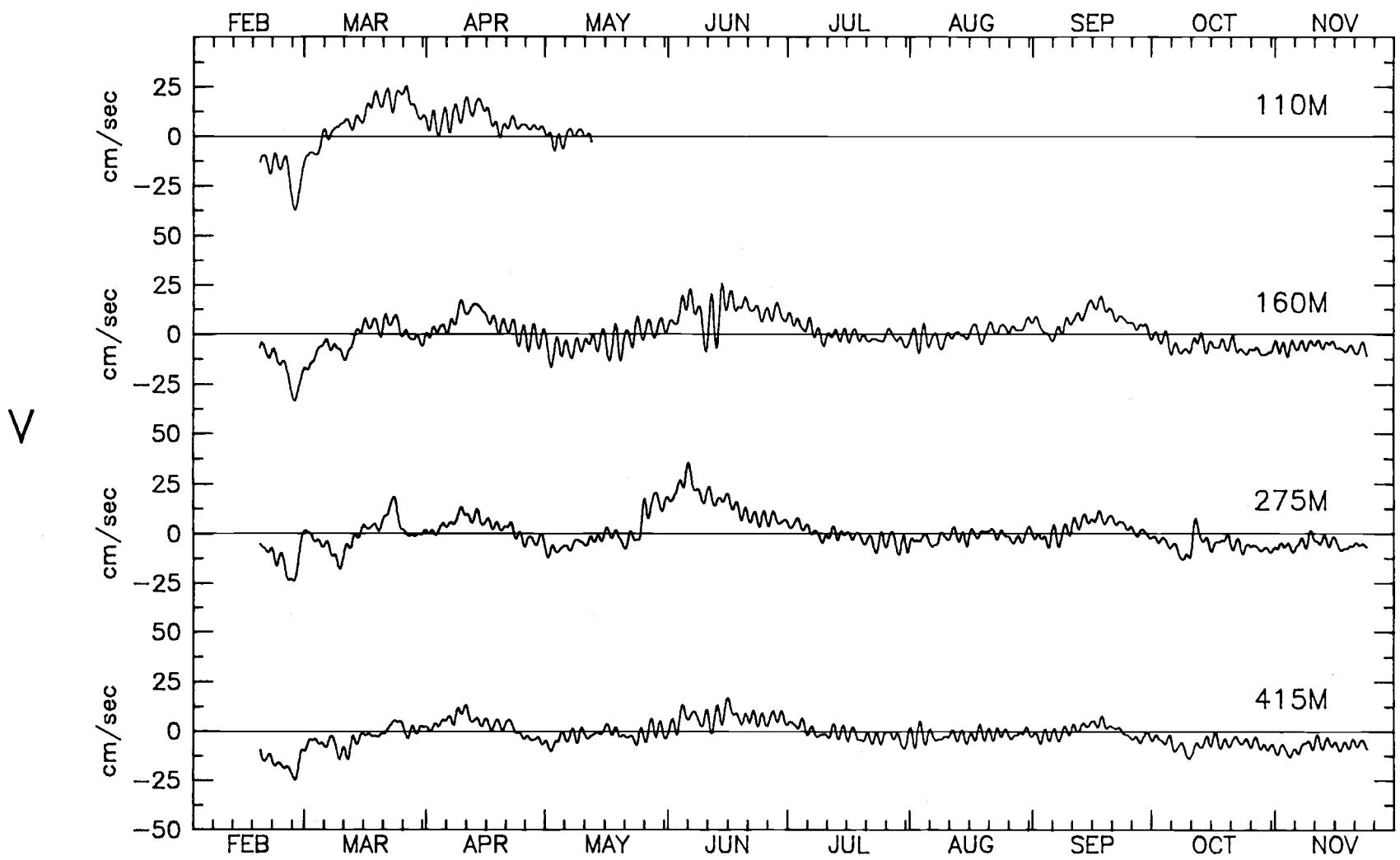
1983

U



10 South Offshore Period IV

1983

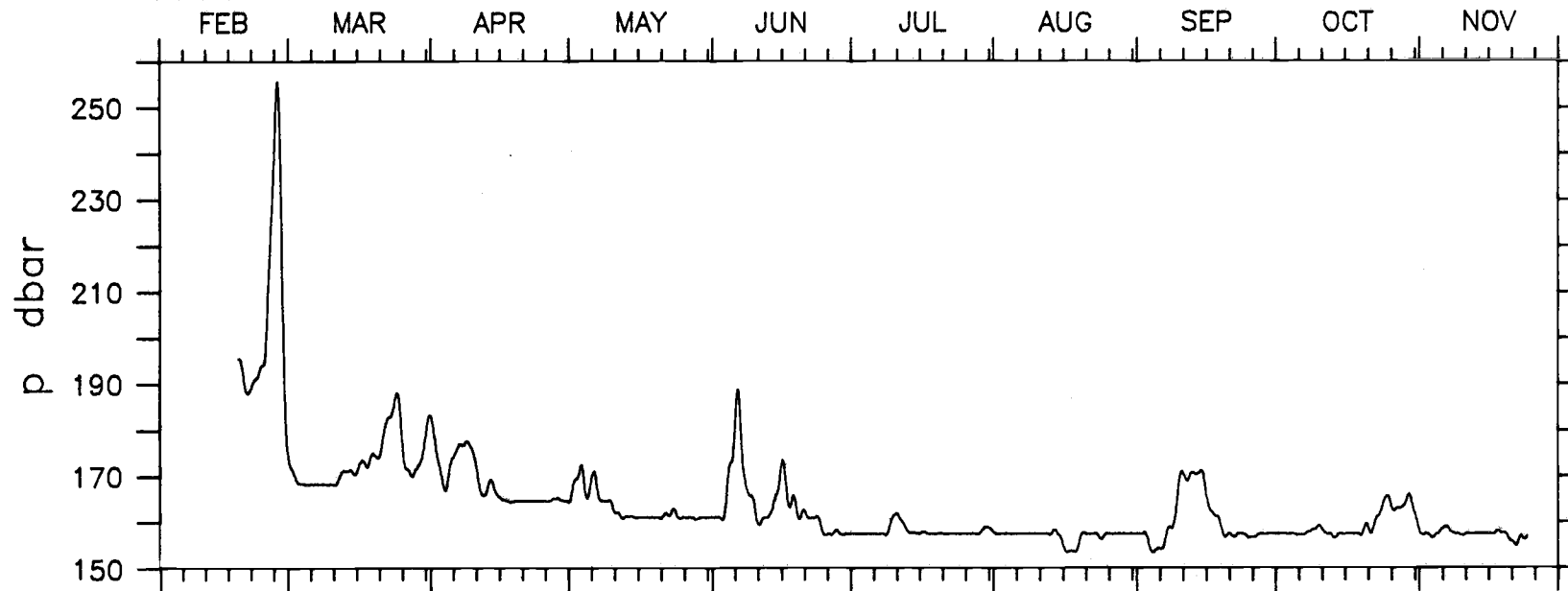


V

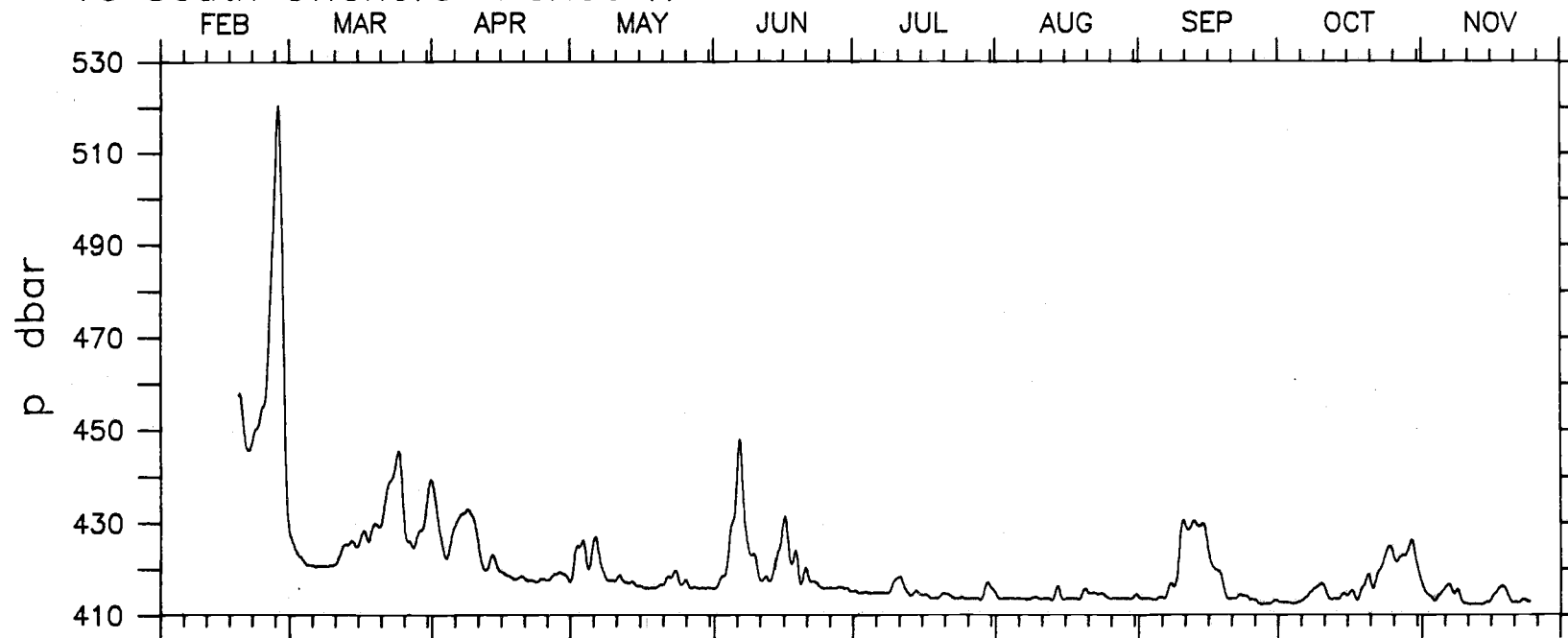
220

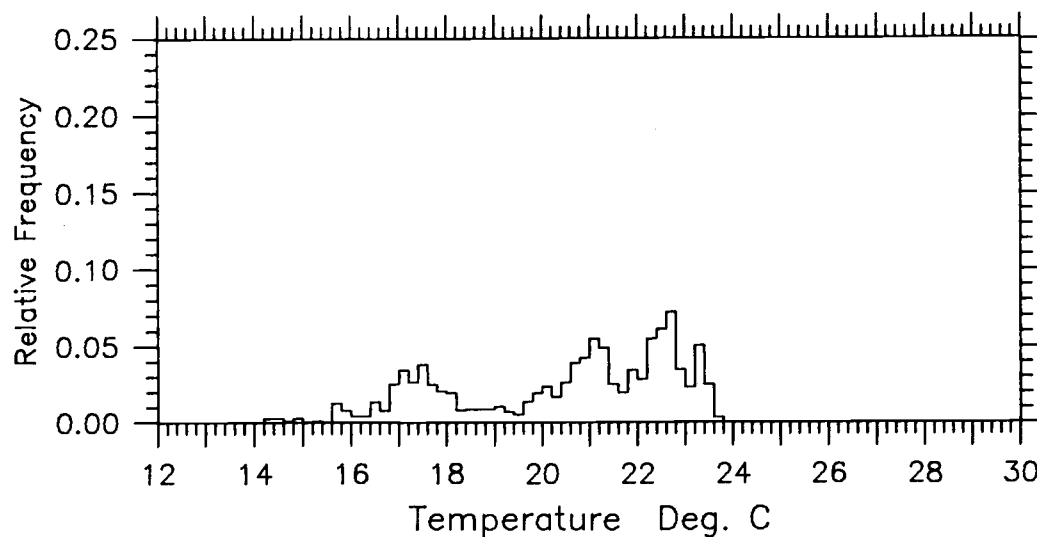
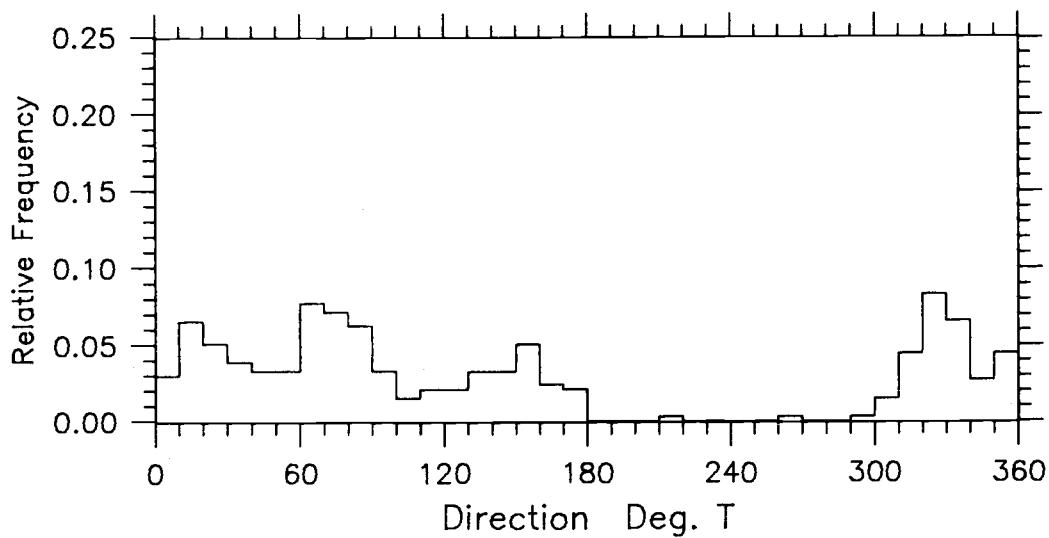
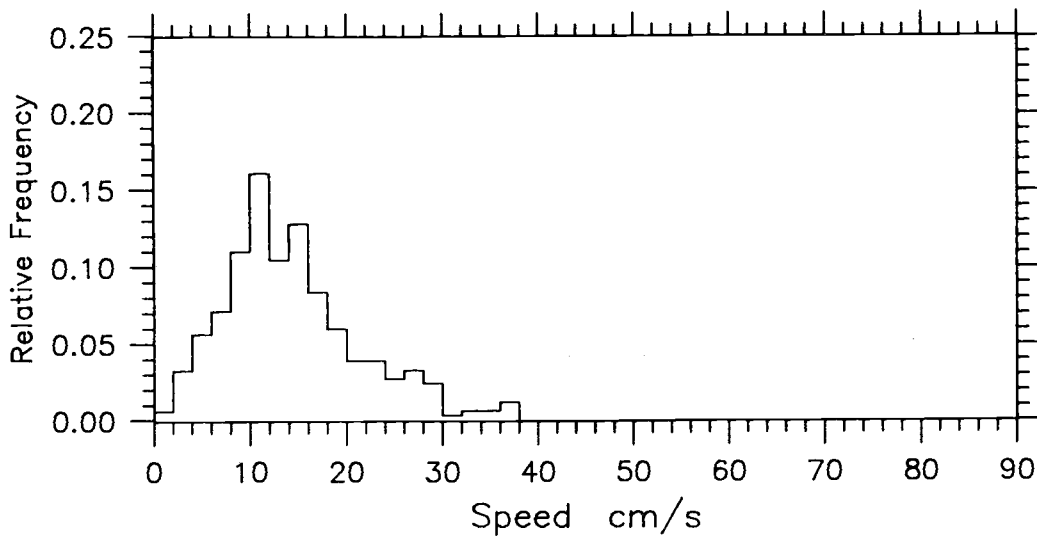
10 South Offshore Period IV

10 South Offshore Period IV 1983

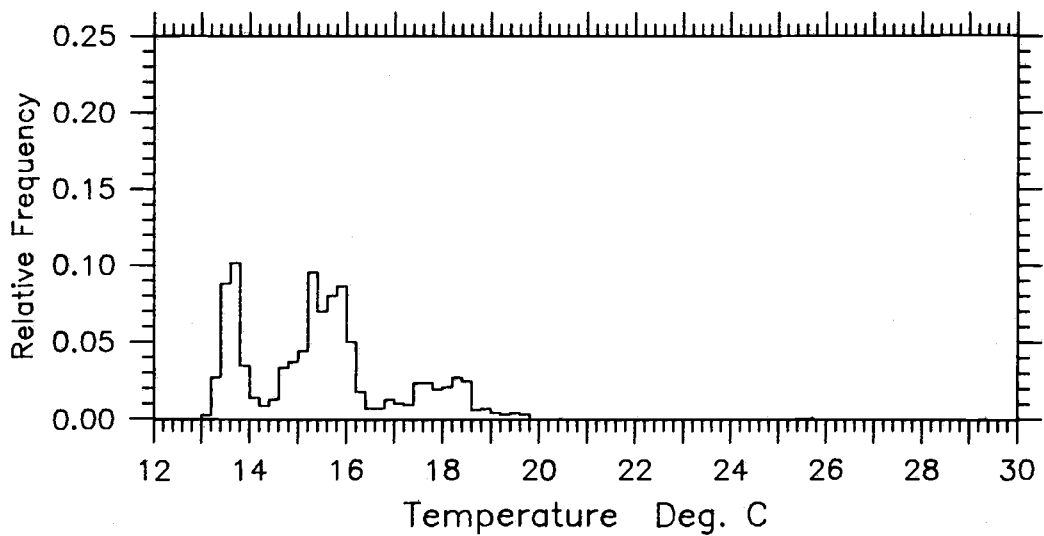
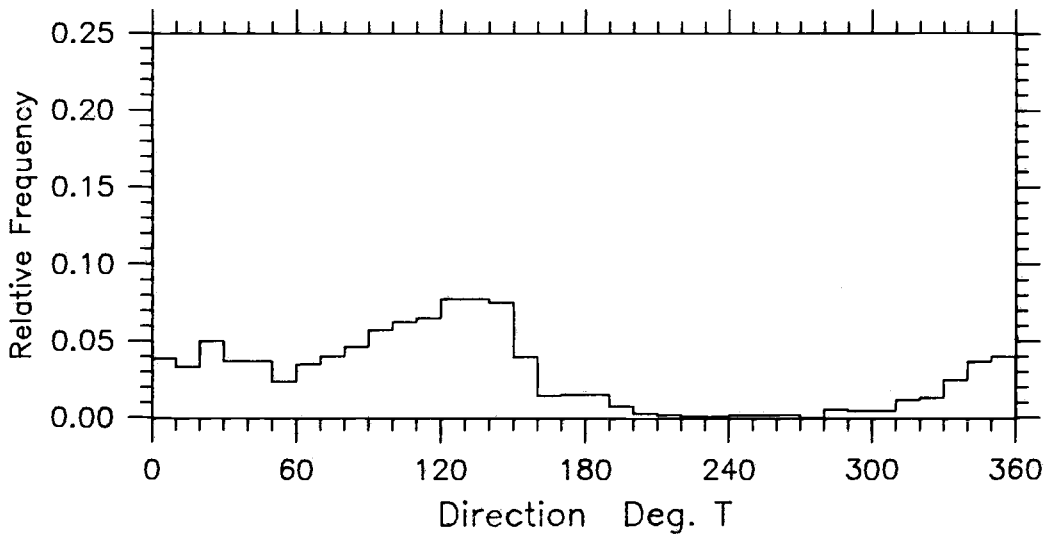
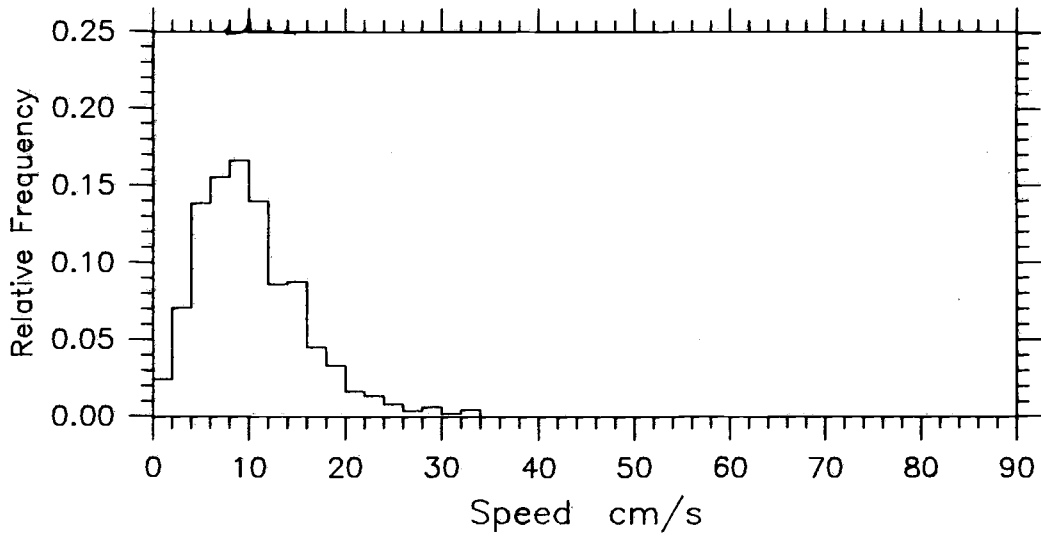


10 South Offshore Period IV 1983

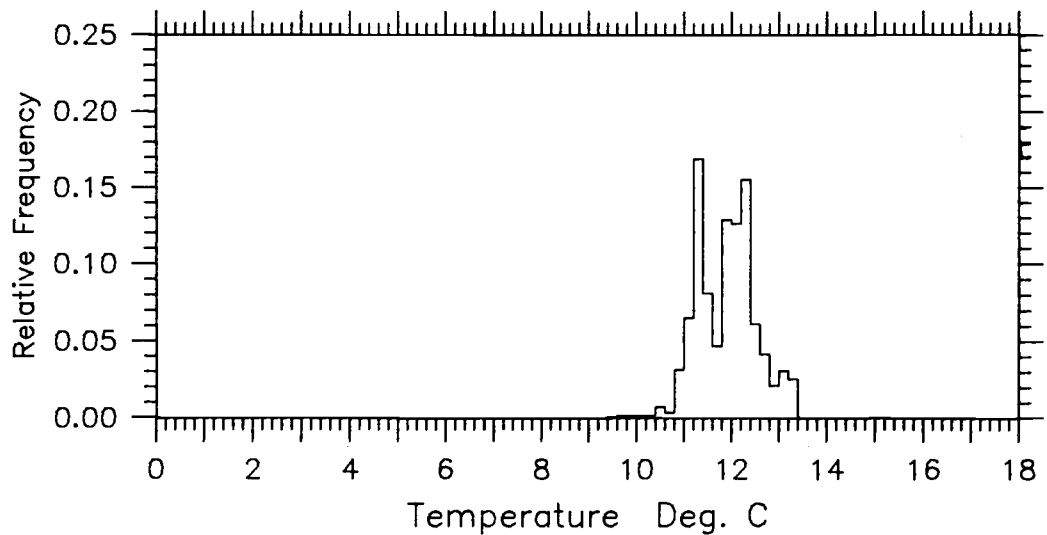
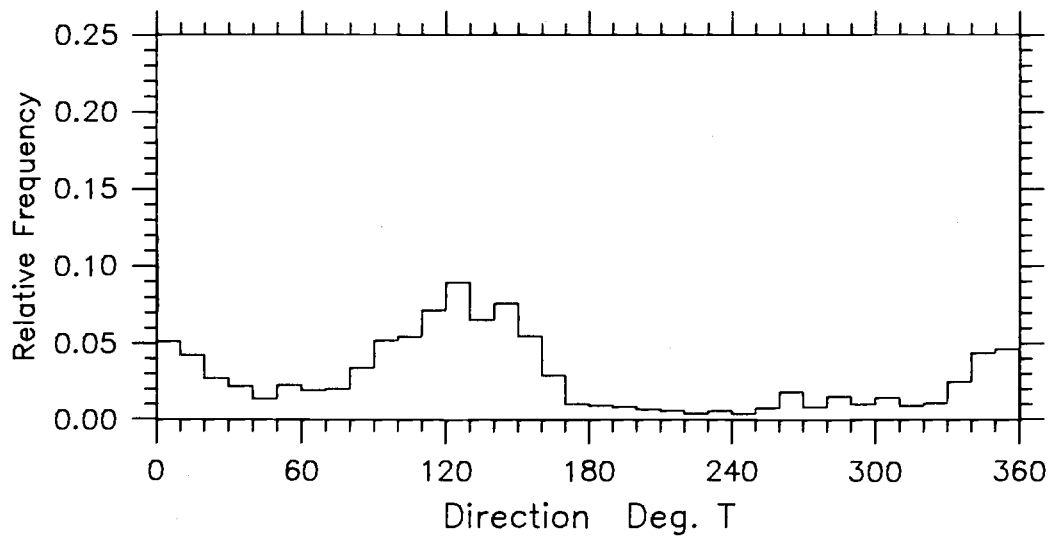
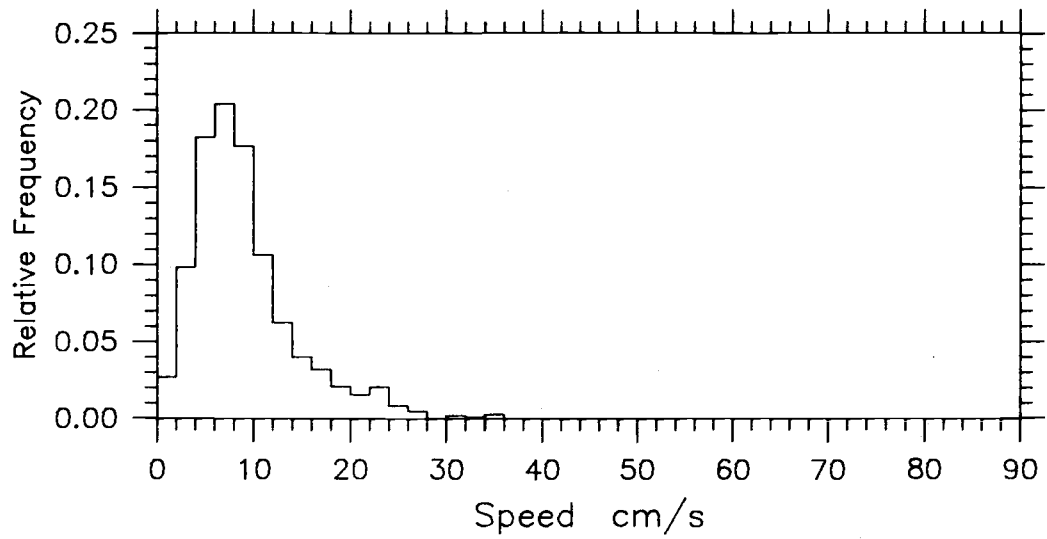




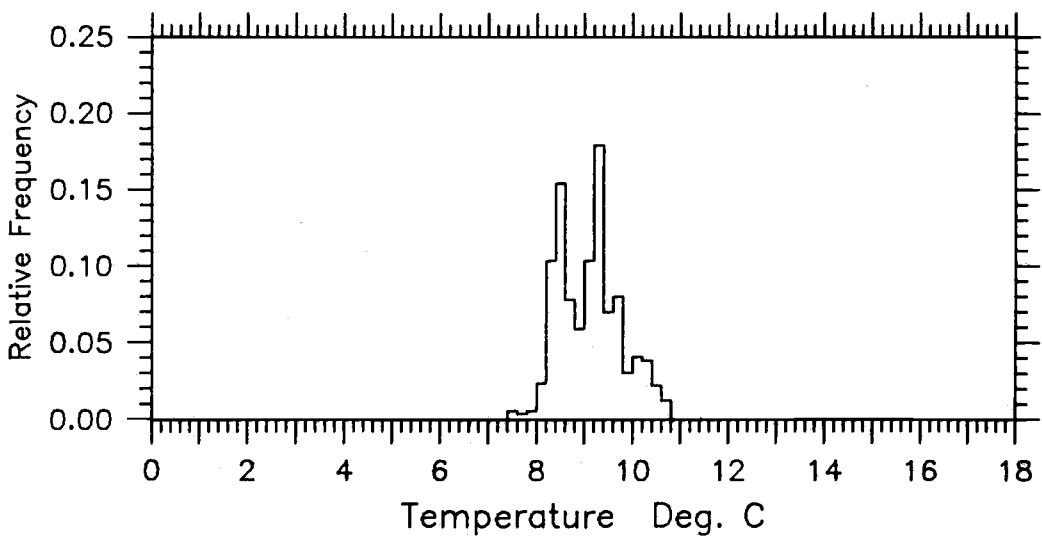
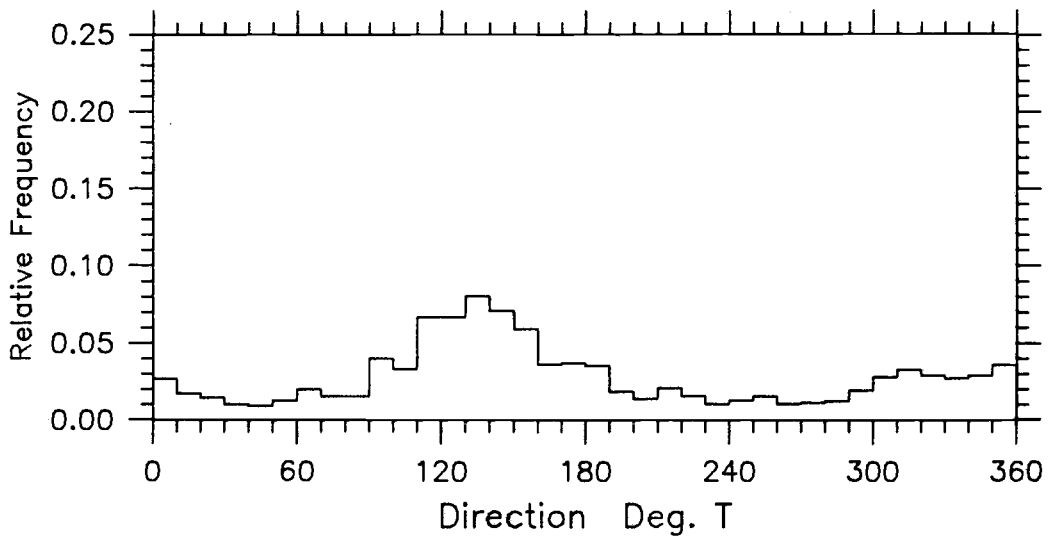
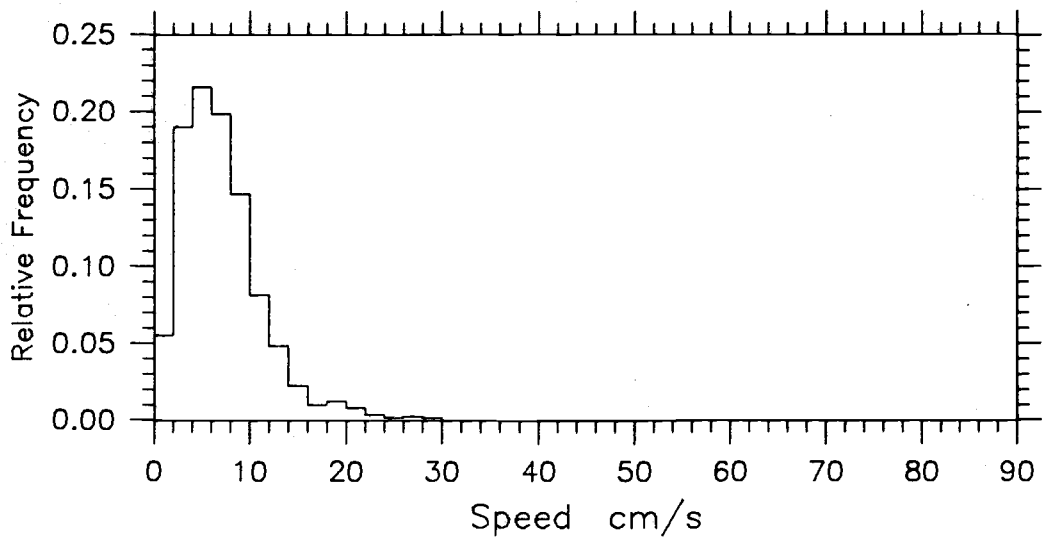
10 South Offshore Period IV 110m



10 South Offshore Period IV 160m



10 South Offshore Period IV 275m

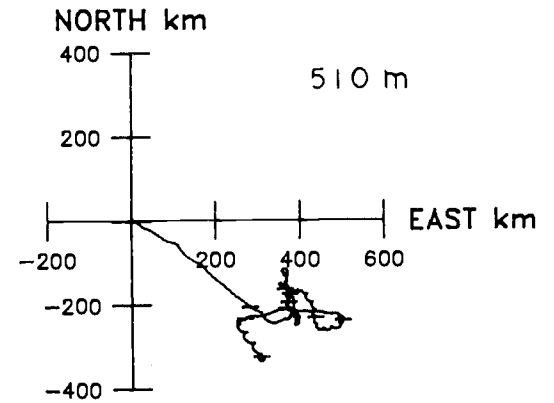
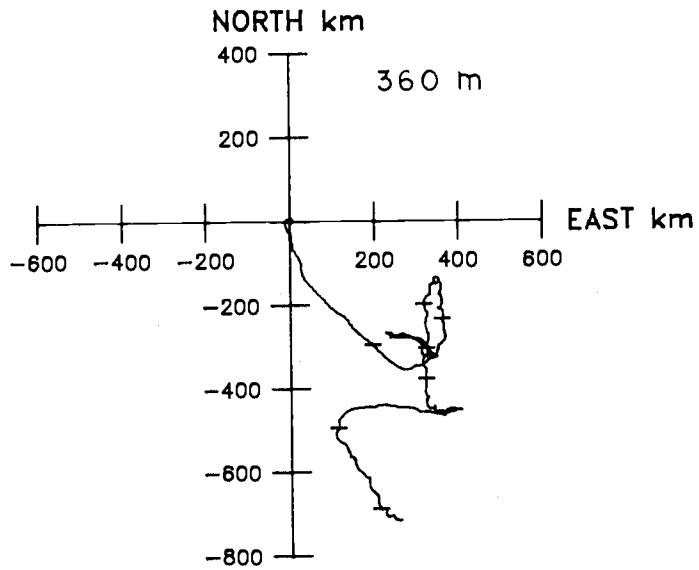
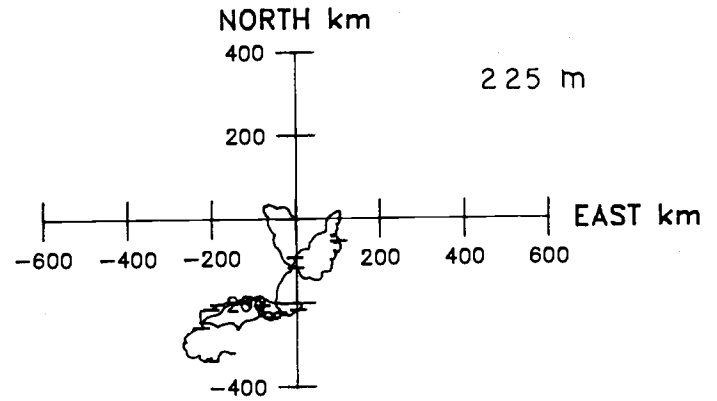
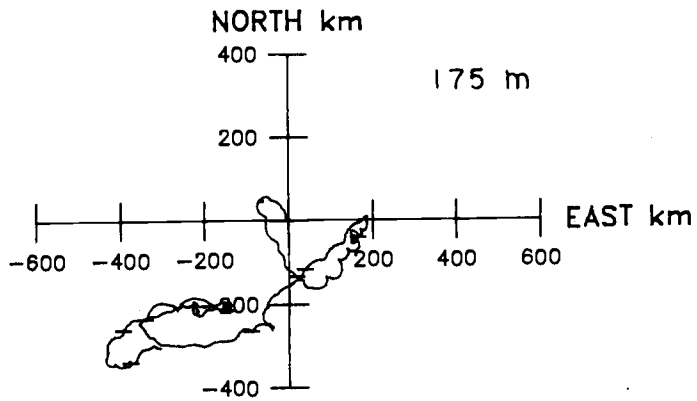


10 South Offshore Period IV 415m

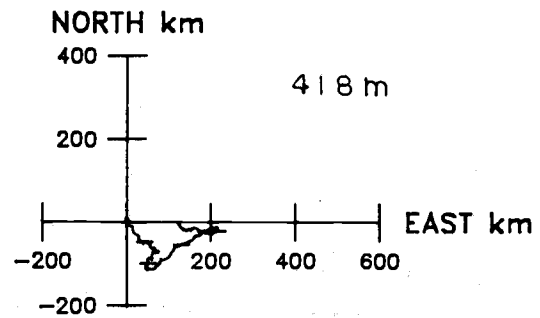
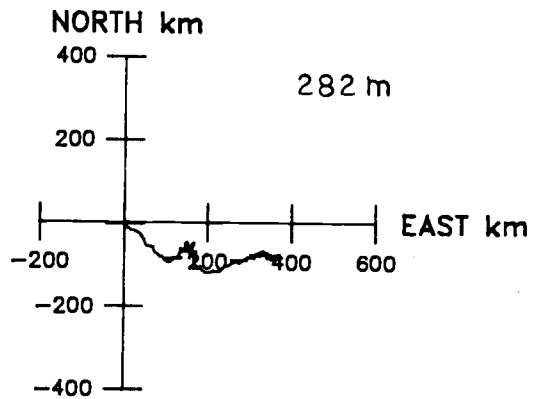
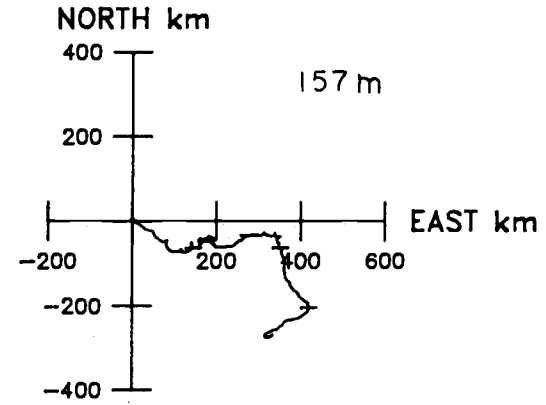
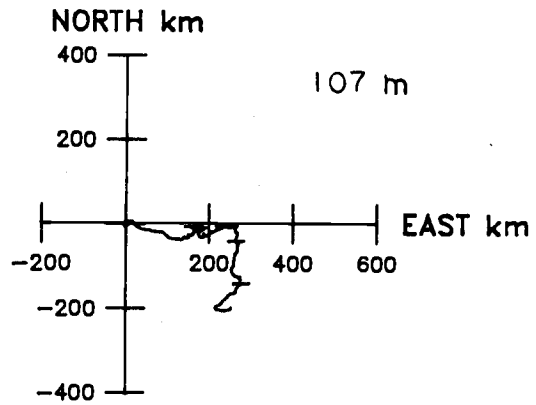
MOORING 85 WEST

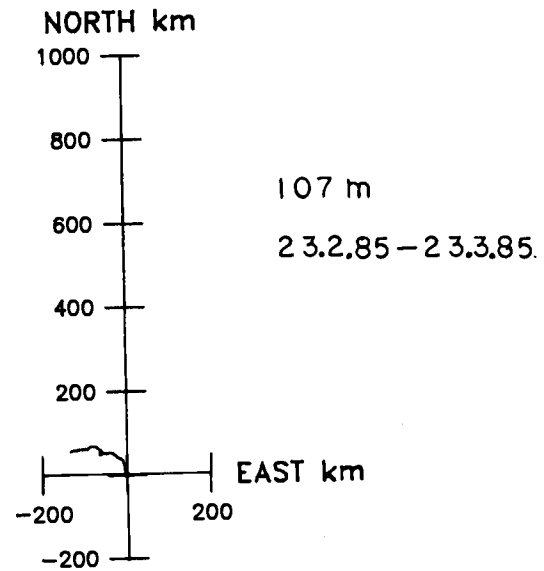
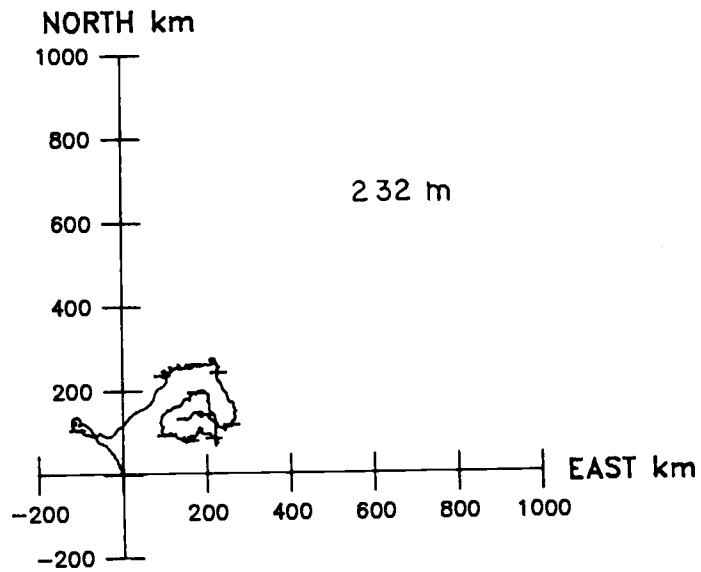
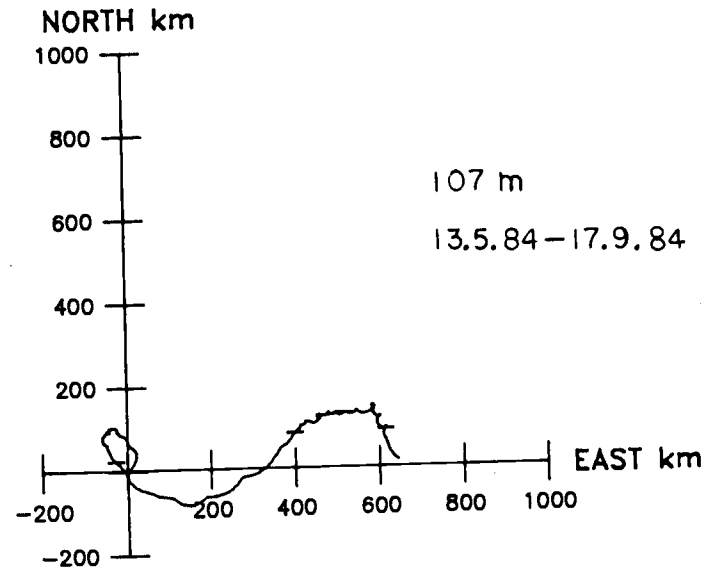
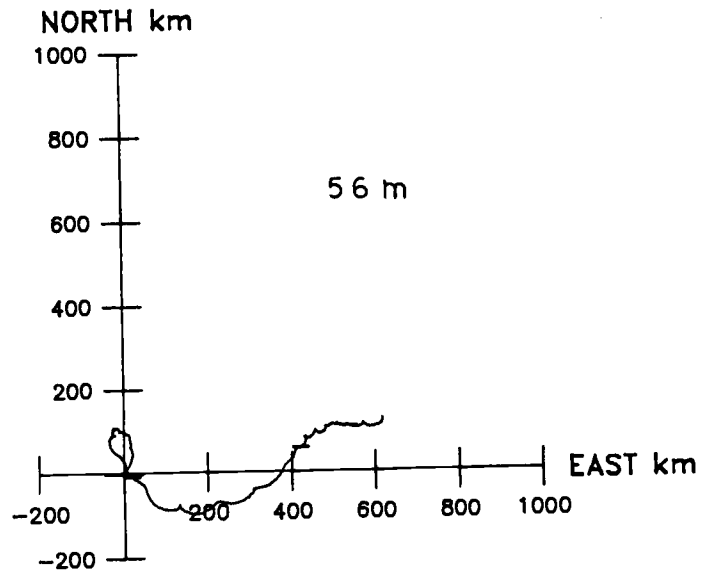
MOORING 85 West

PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
IV	175	1129	1129	-1.3 (9.3)	-1.2 (8.0)	14.22 (0.51)	13.10	15.78	1.8	225.6	69.9
	225	1129	1129	-0.6 (7.9)	-1.3 (6.9)	13.20 (0.50)	12.00	14.23	1.4	204.8	70.0
	360	1129	1129	1.1 (7.5)	-2.9 (7.3)	9.99 (0.63)	8.52	11.53	3.1	160.1	-48.6
	510	1129	1129	1.3 (6.5)	-1.4 (5.4)	7.75 (0.36)	6.72	8.55	1.9	136.5	-57.0
V	107	690	690	1.7 (4.8)	-1.4 (4.1)	14.38 (0.19)	13.86	14.98	2.2	128.5	67.8
	157	690	690	2.2 (5.2)	-1.8 (4.3)	13.72 (0.12)	13.34	14.22	2.9	128.9	73.4
	282	690	690	1.8 (4.8)	-0.6 (4.3)	11.77 (0.44)	10.76	12.79	1.9	109.2	81.0
	418	690	690	0.8 (4.0)	0.0 (3.6)	9.13 (0.32)	8.33	9.72	0.8	88.8	58.2
VI	56	455	1259	5.2 (10.2)	1.5 (9.4)	15.56 (0.75)	14.46	18.98	5.5	73.8	82.1
	107	627	1259	3.8 (9.2)	0.5 (8.3)	14.37 (0.23)	13.83	14.92	3.8	81.8	75.8
	232	1259	1259	0.5 (5.6)	0.5 (5.6)	13.08 (0.41)	12.28	13.90	0.7	45.3	32.8
	379		1258			10.27 (0.40)	9.46	11.43			



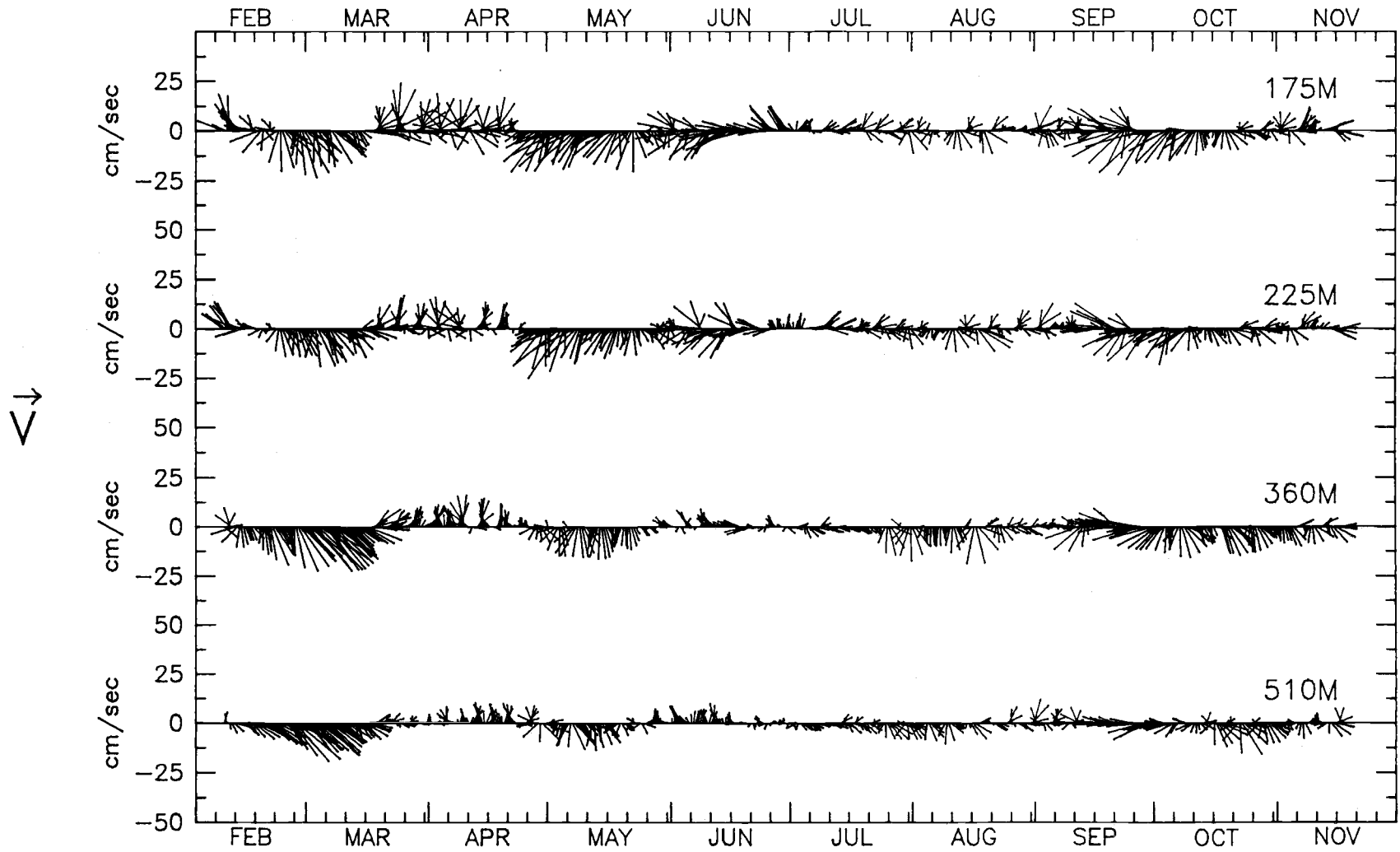
85 West Period IV





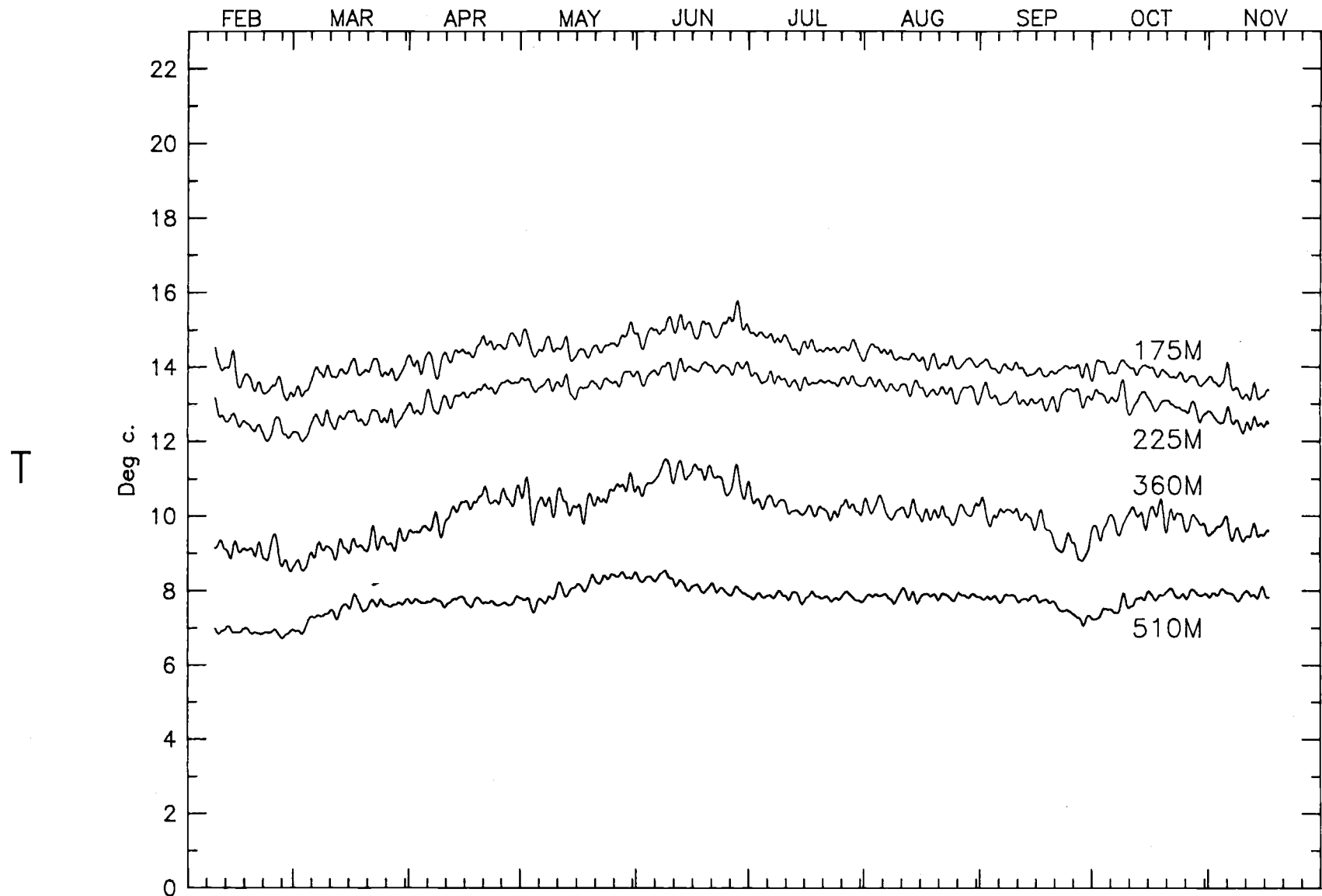
85 West Period VI

1983



85 West Period IV

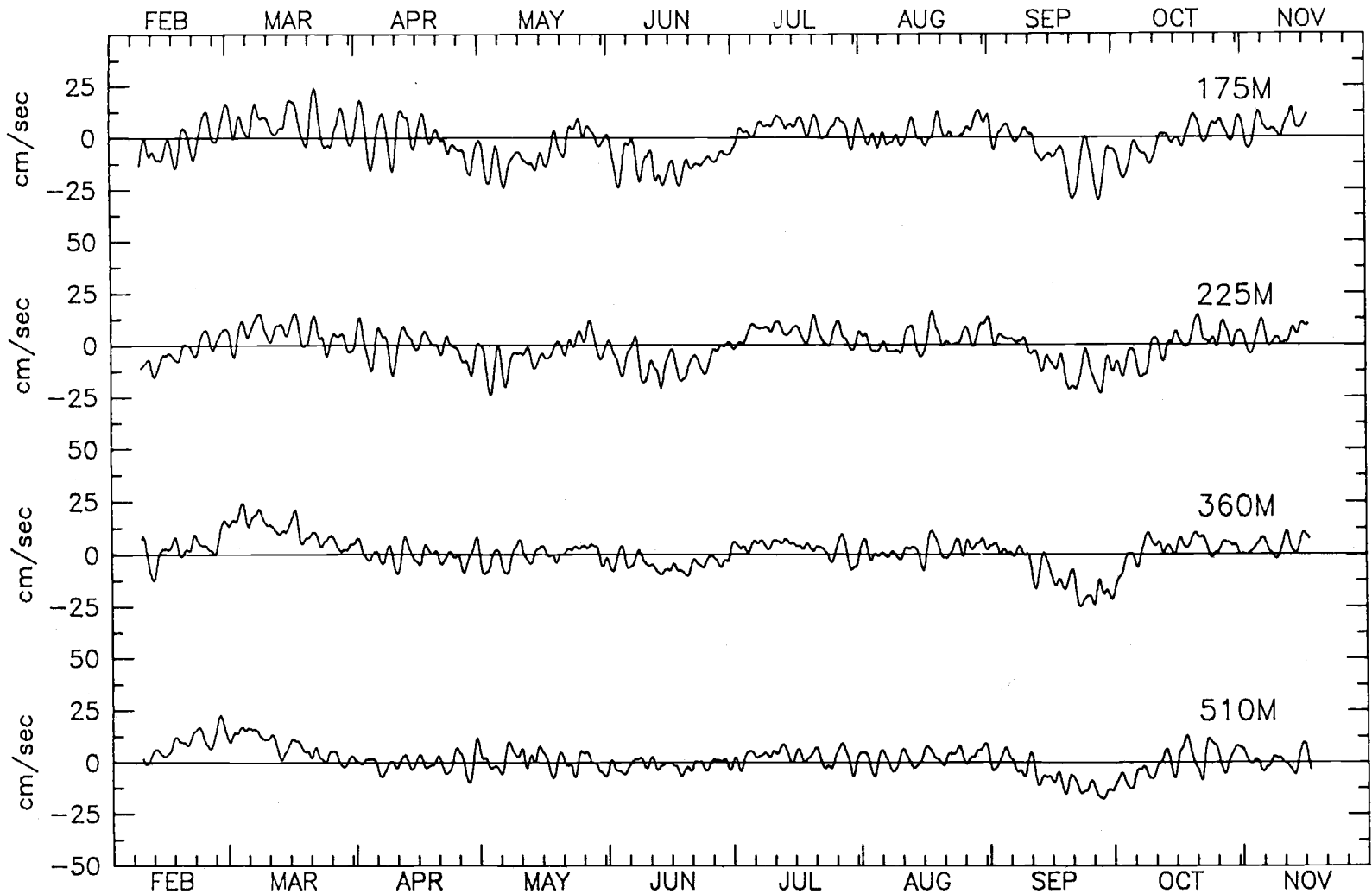
1983



85 West Period IV

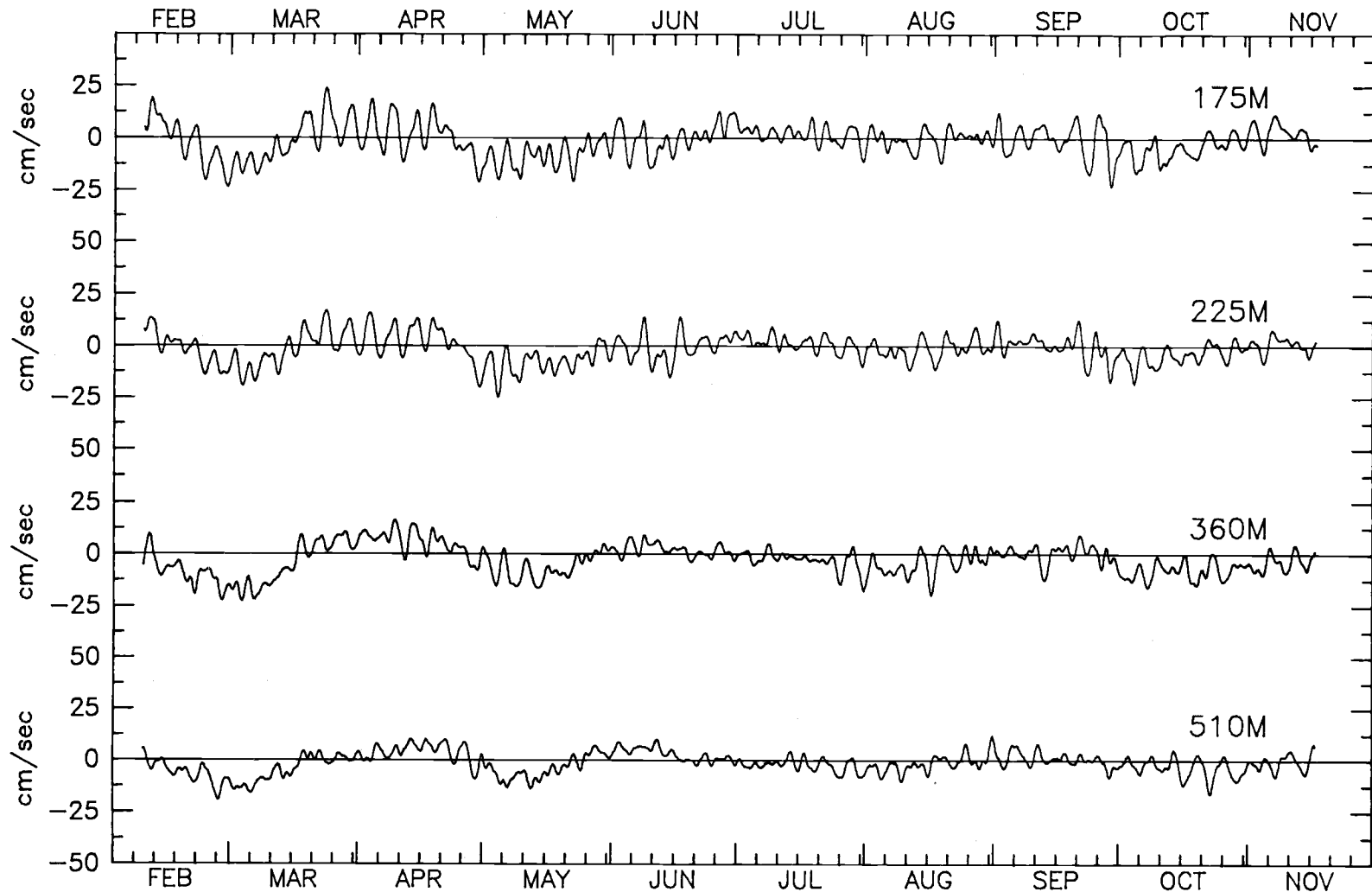
1983

U



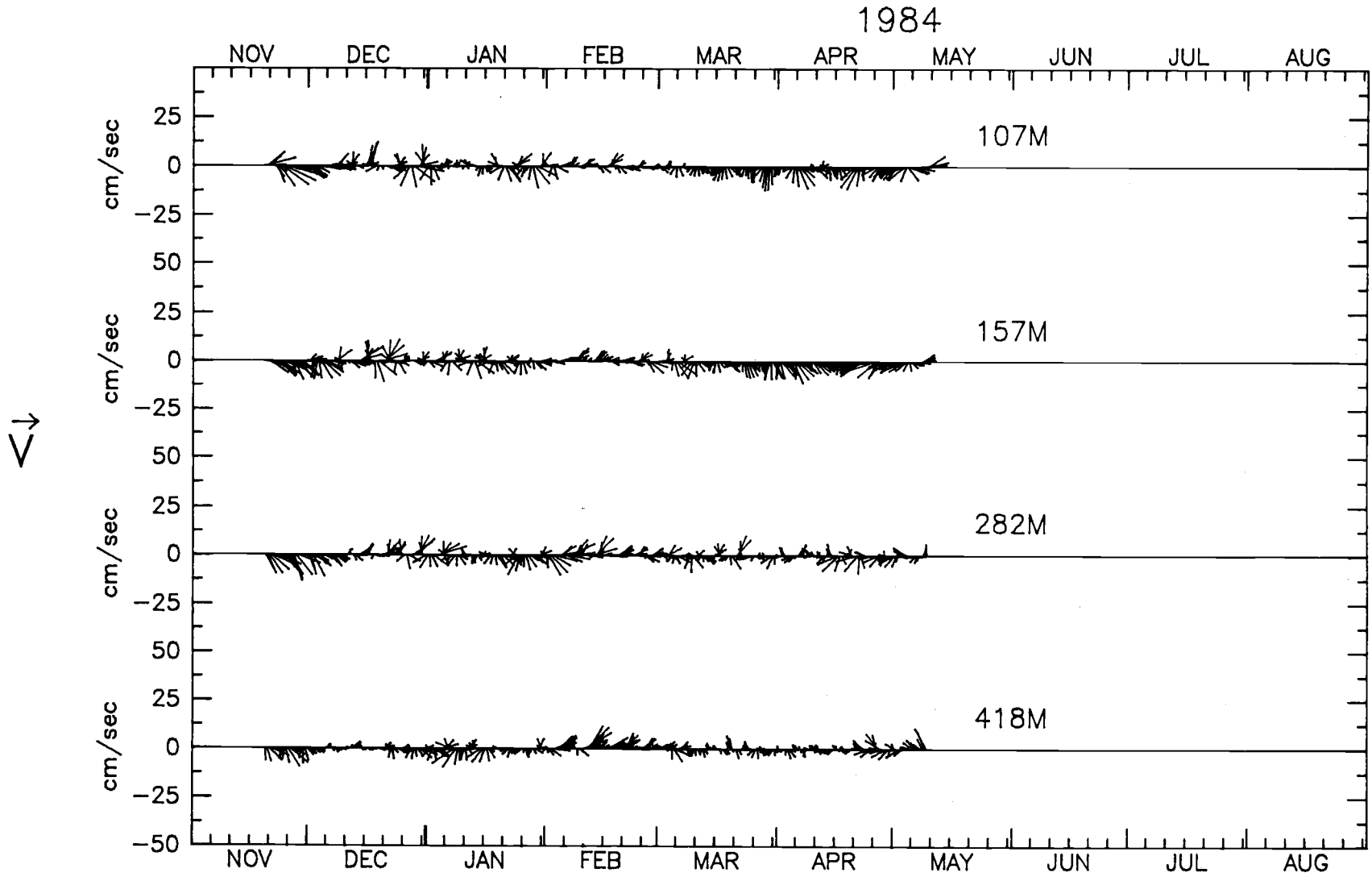
85 West Period IV

1983



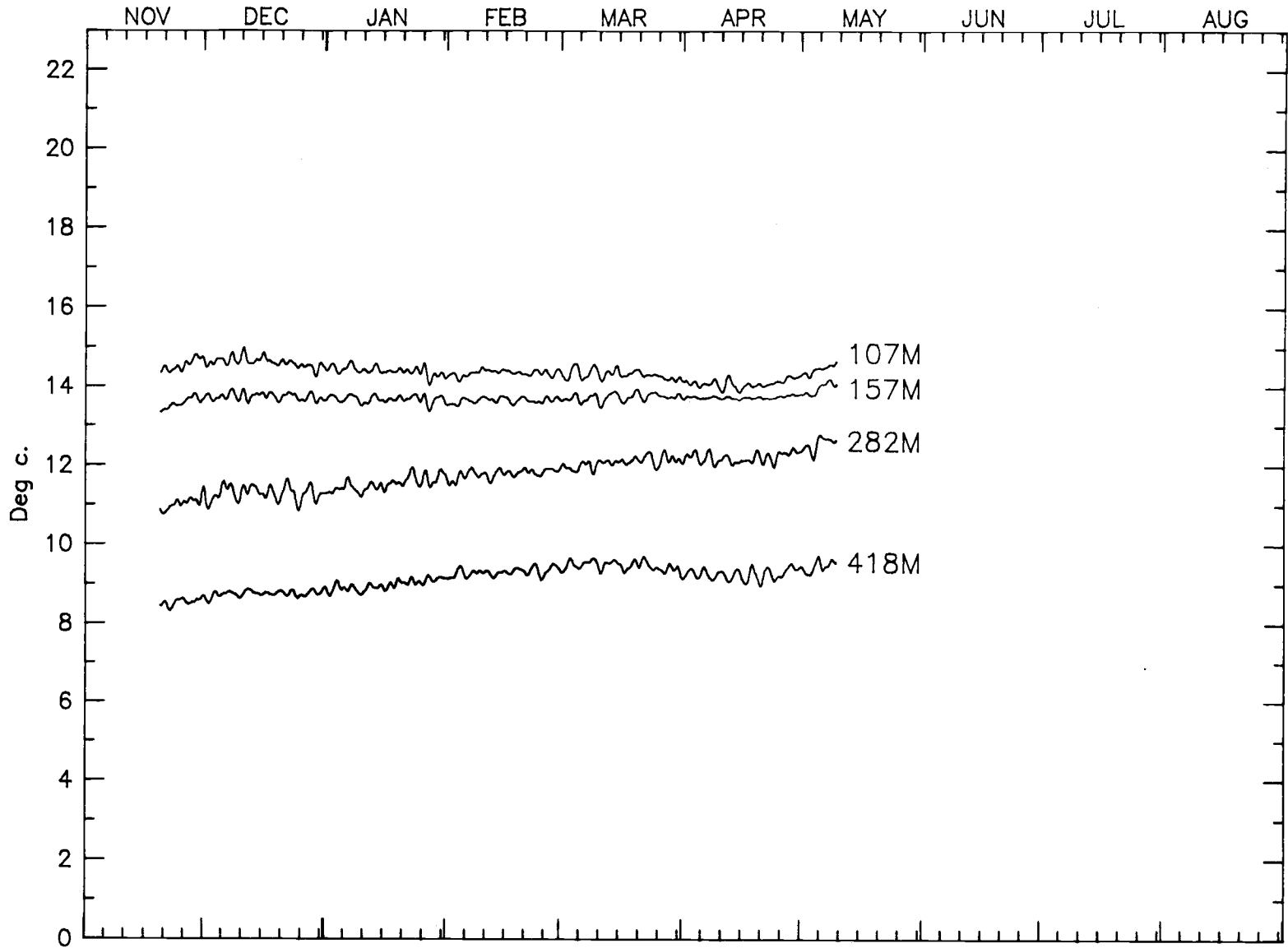
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85 West Period IV



85 West Period V

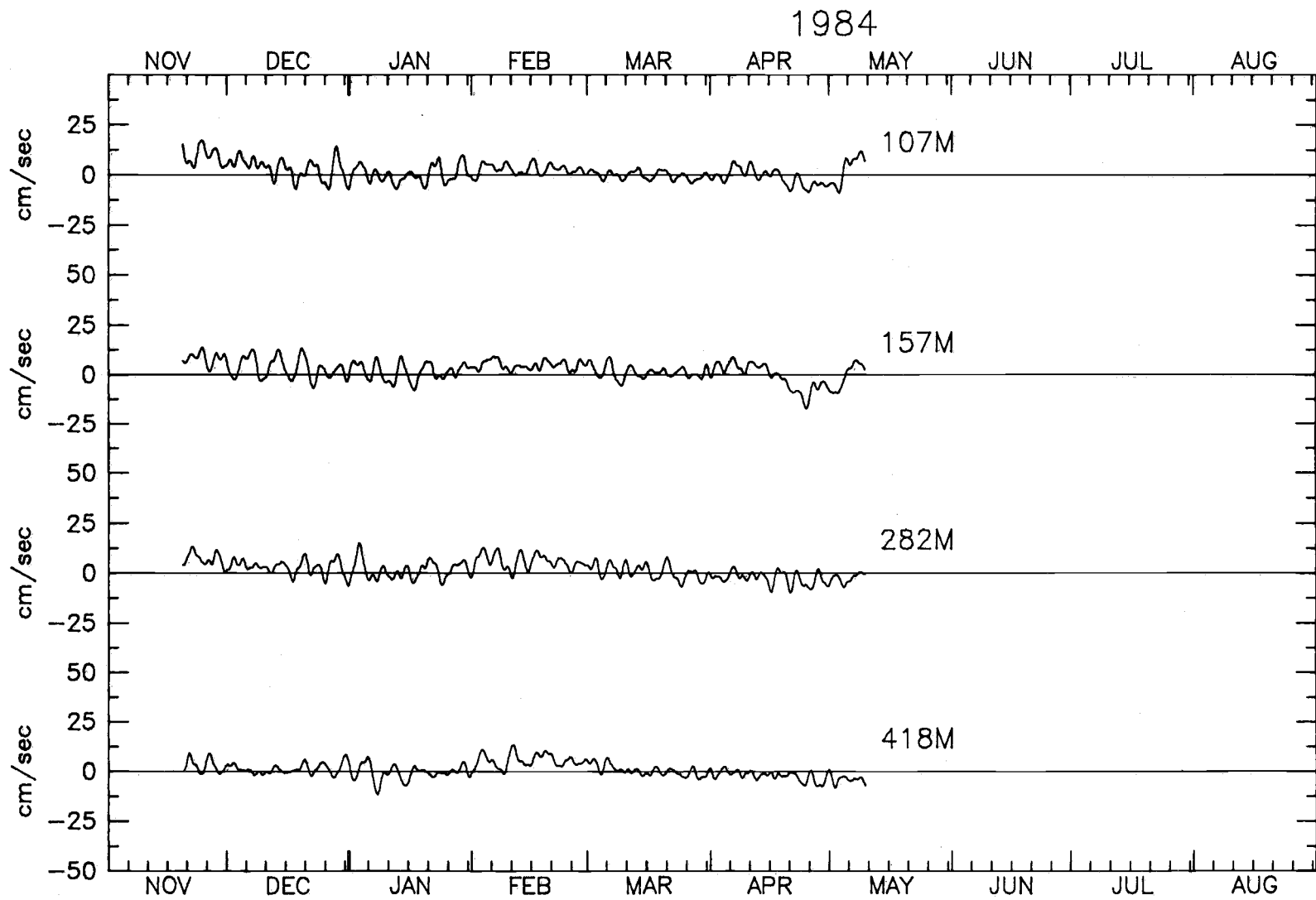
1984



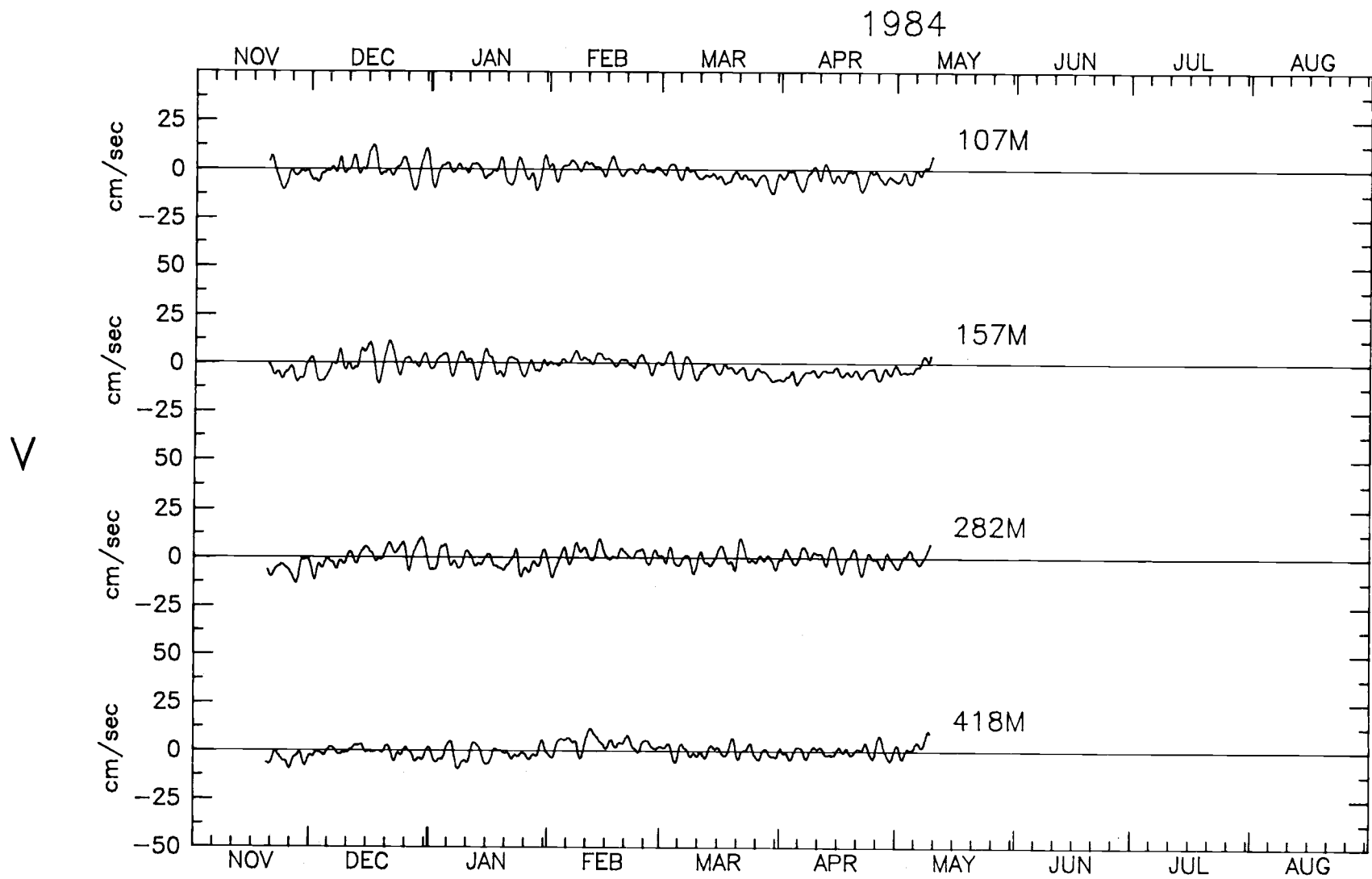
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85 West Period V

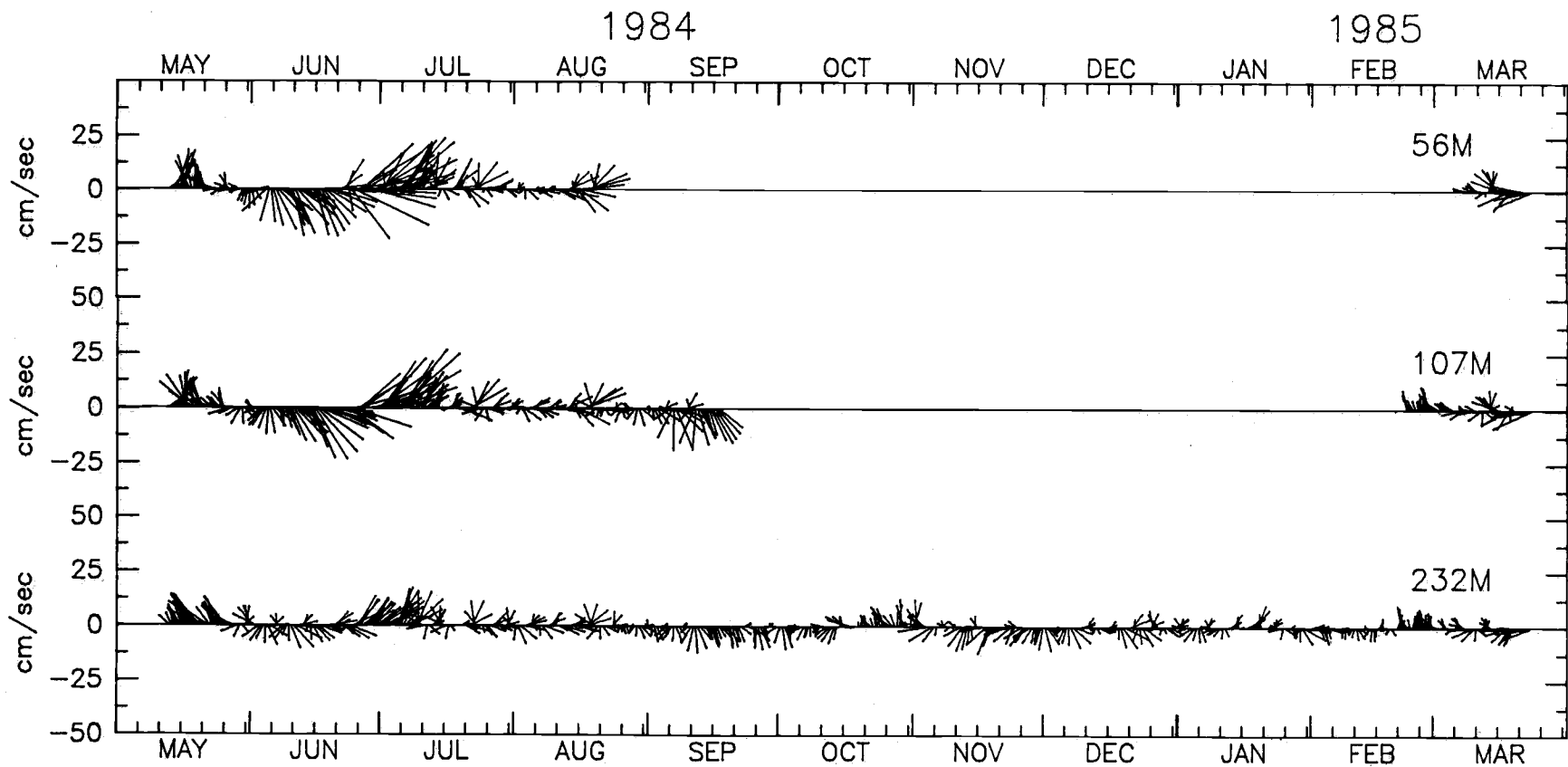
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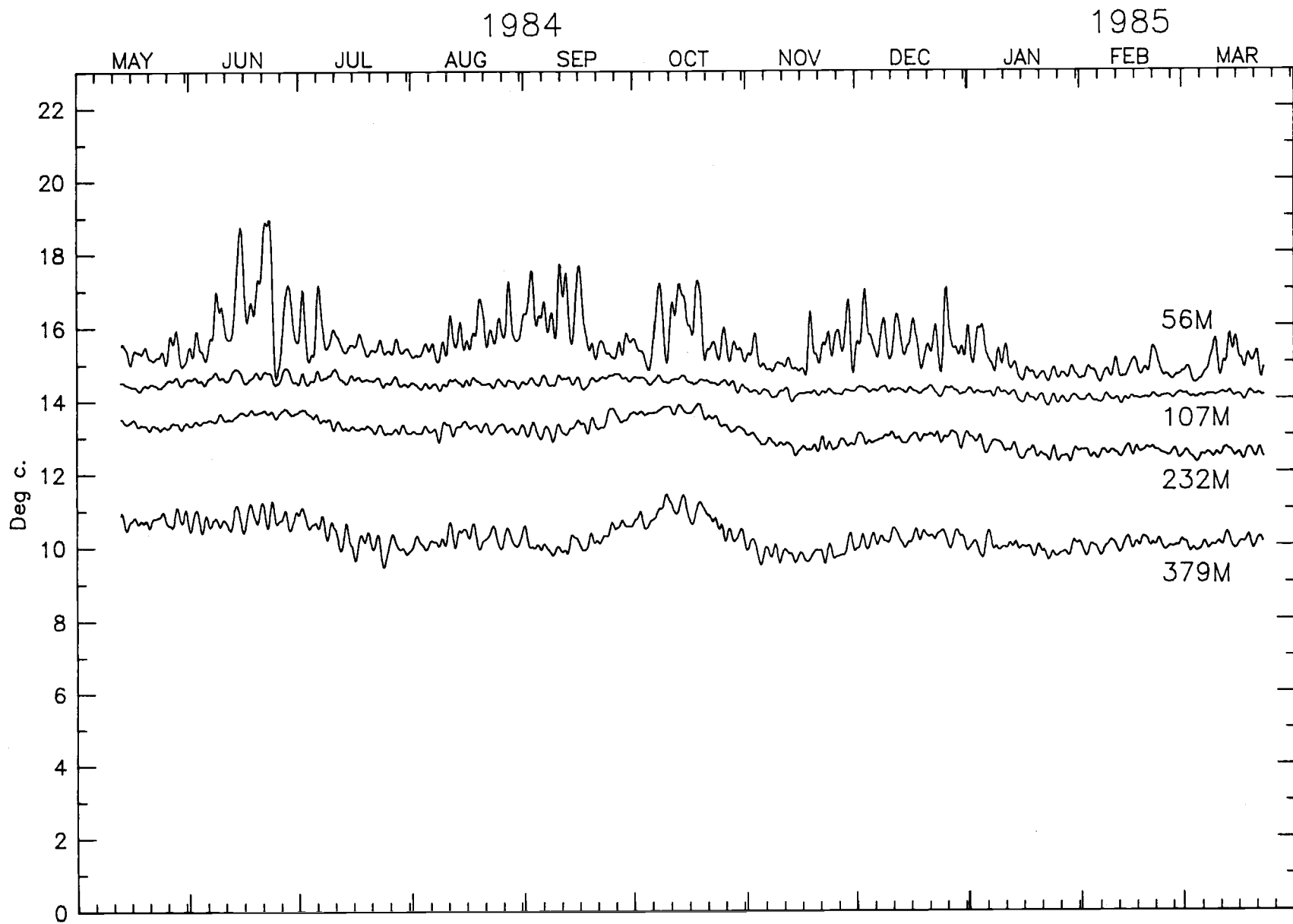


85 West Period V



85 West Period VI

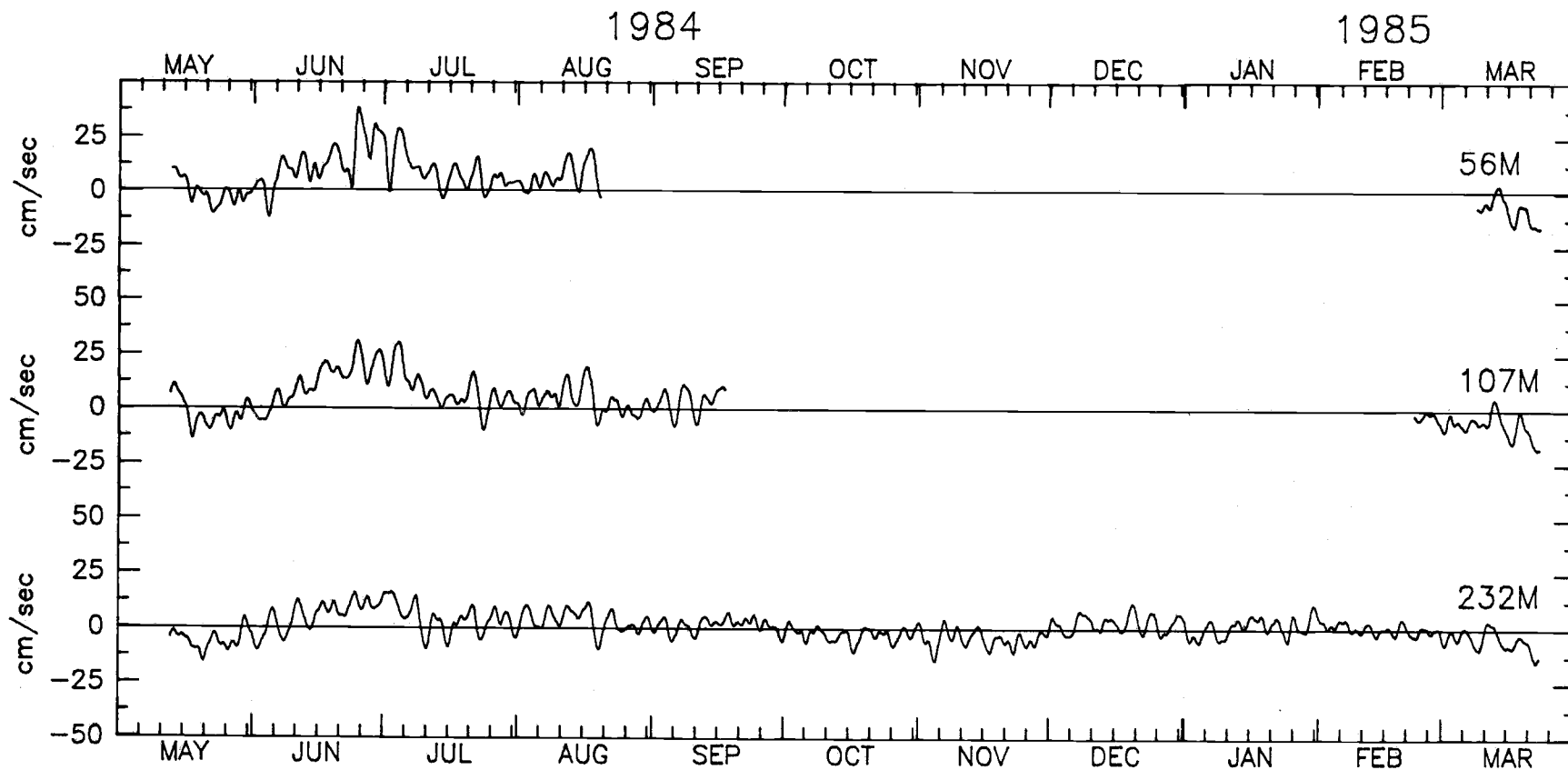
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85 West Period VI

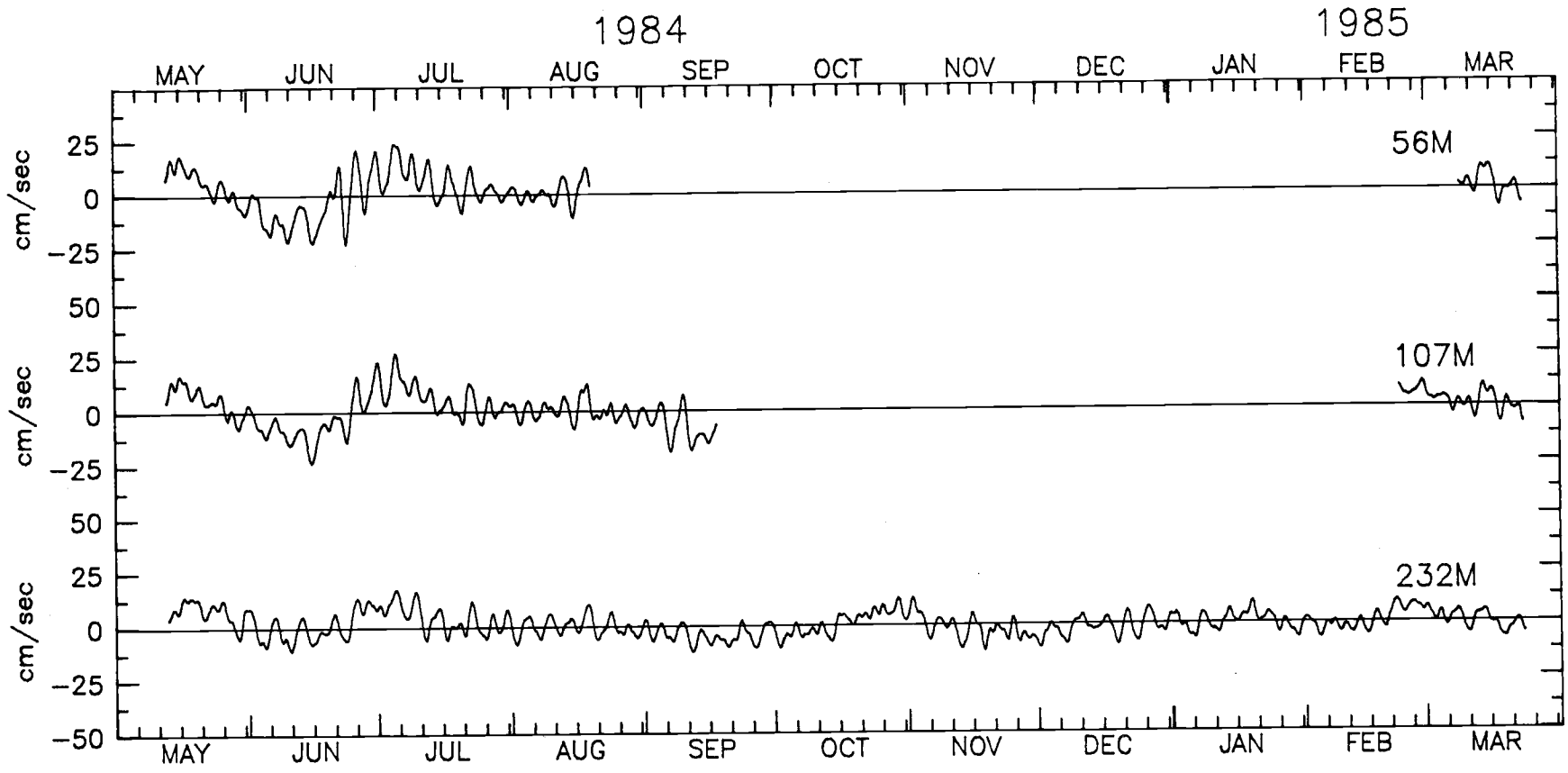
242

U



85 West Period VI

V



1984

1985

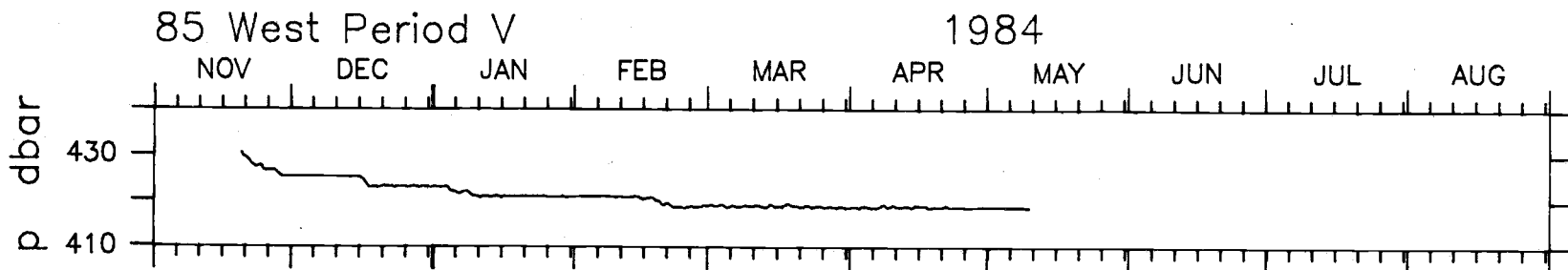
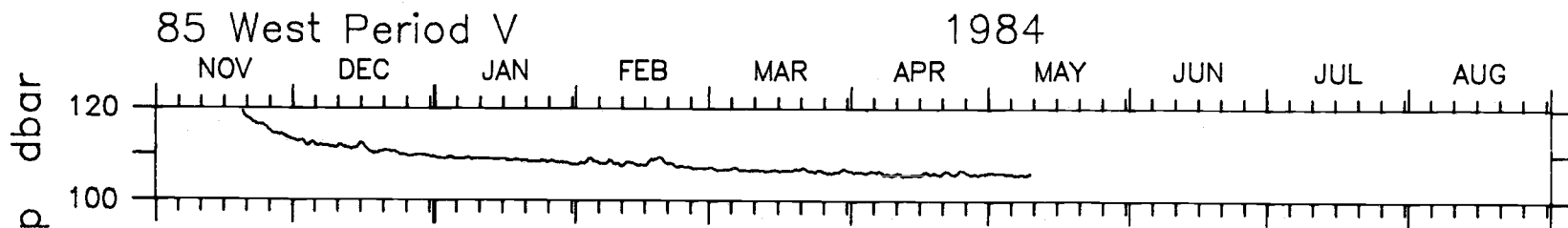
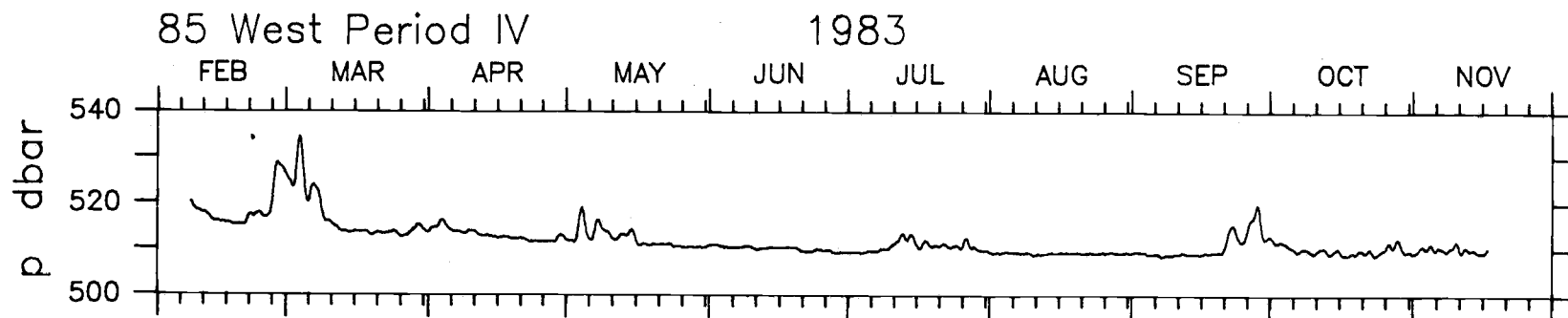
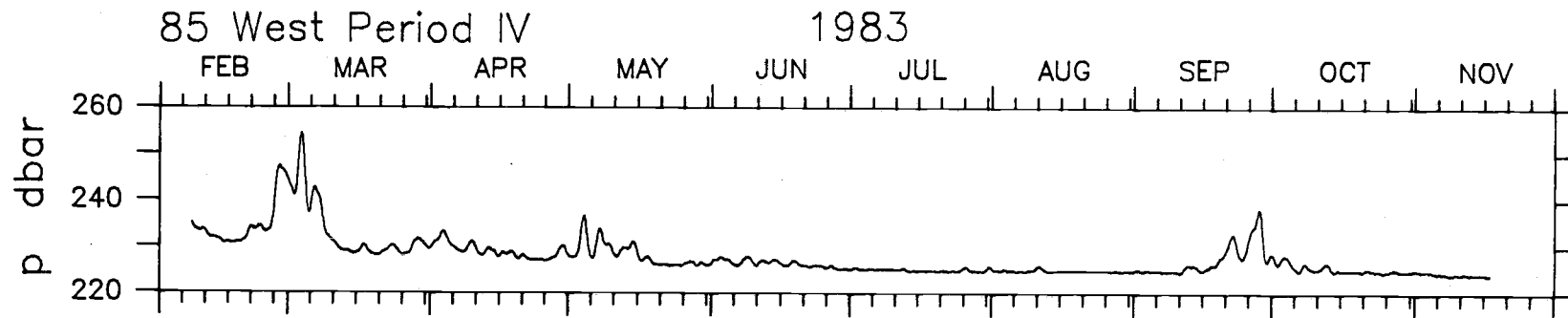
MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR

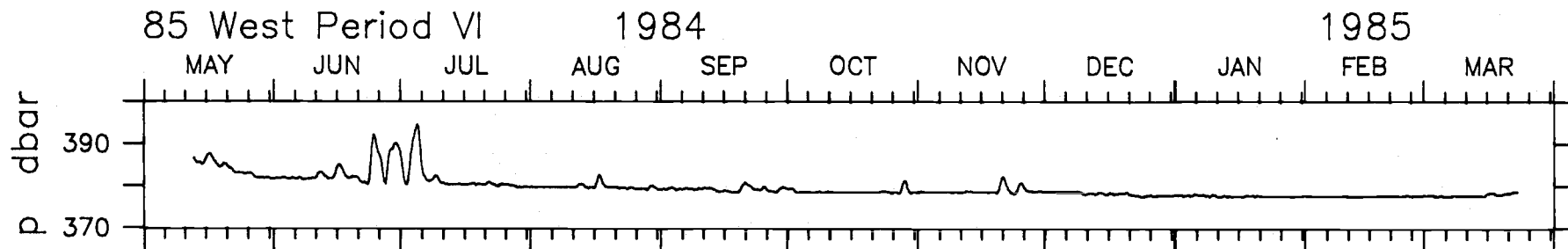
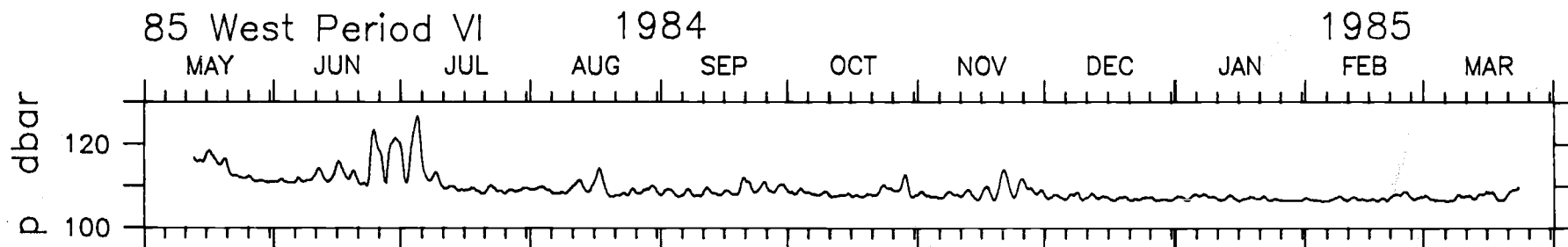
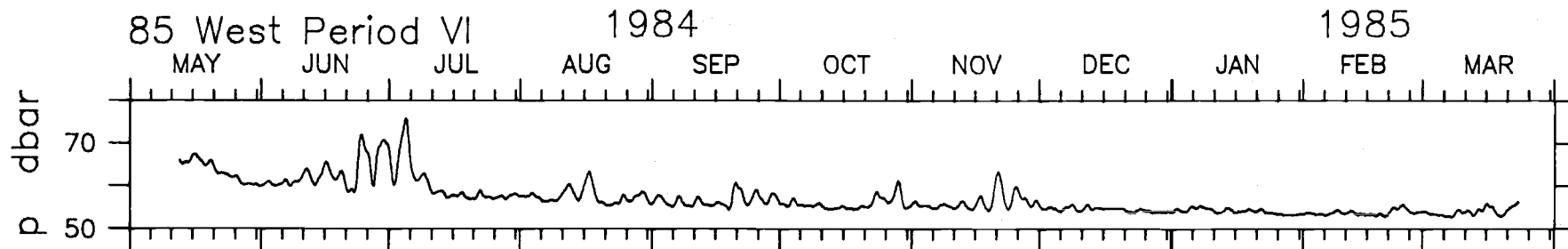
56M

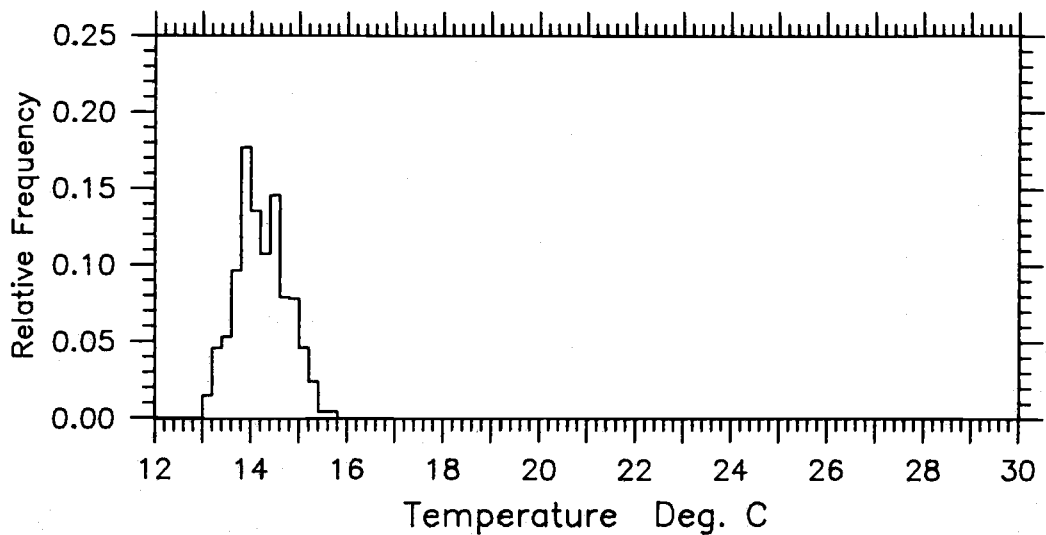
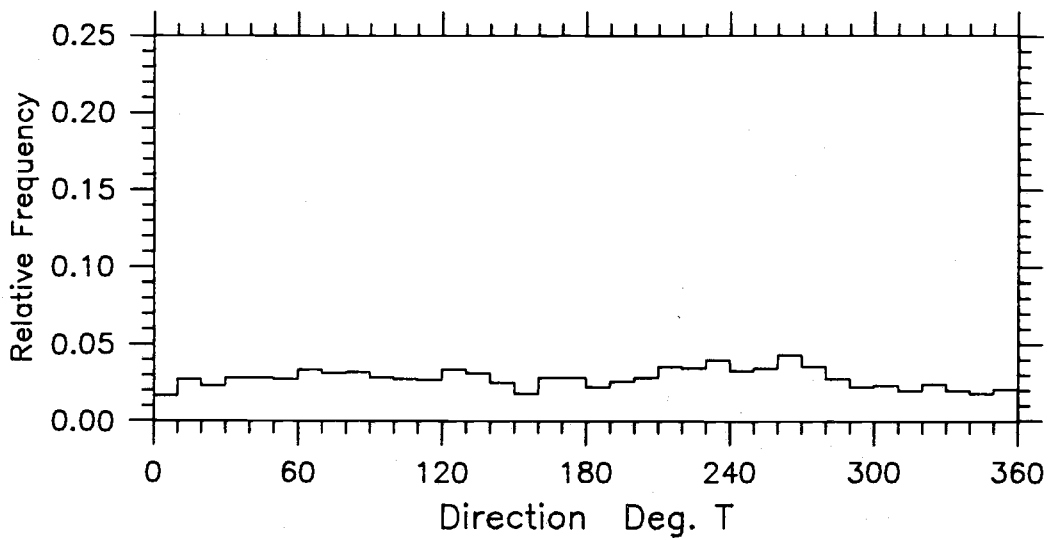
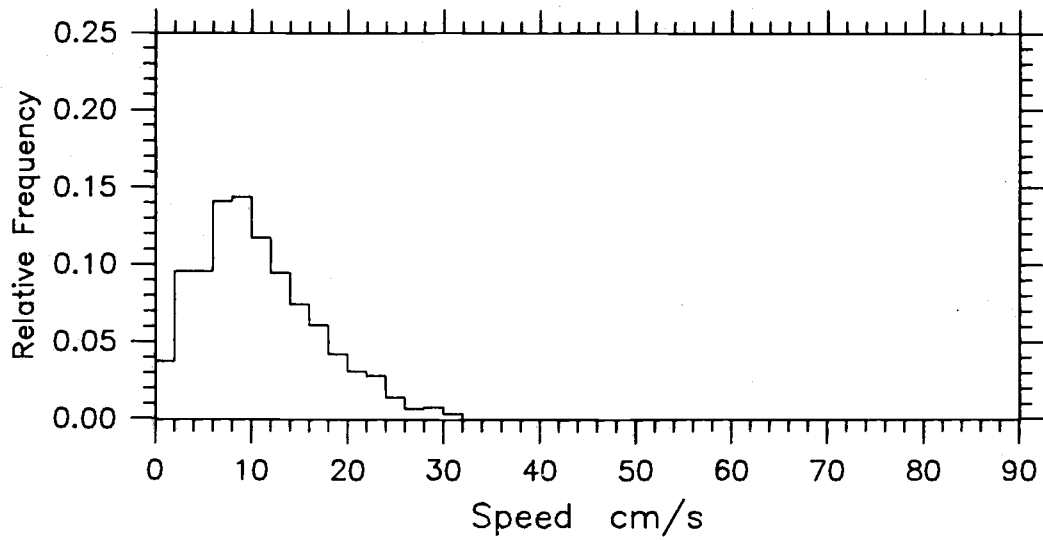
107M

232M

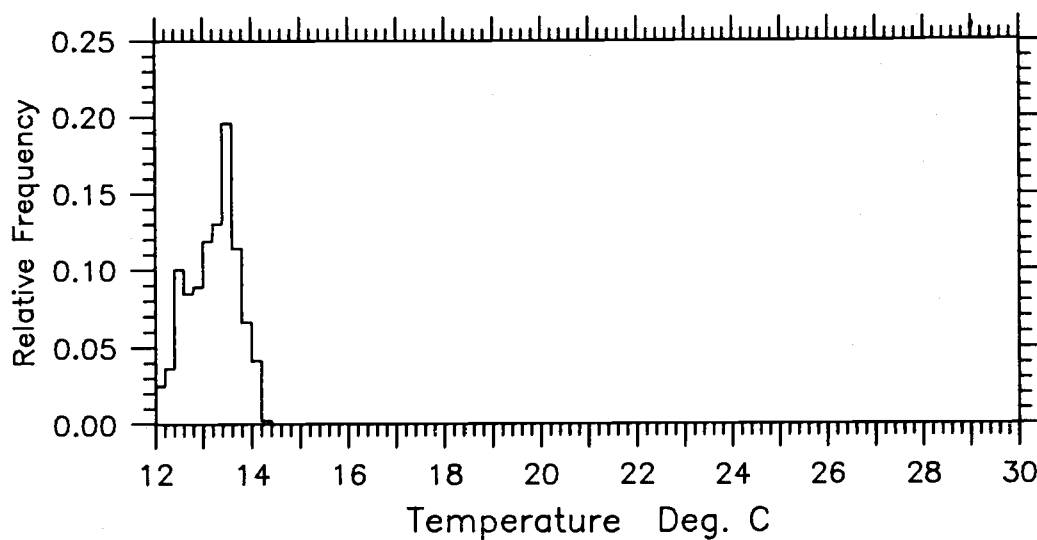
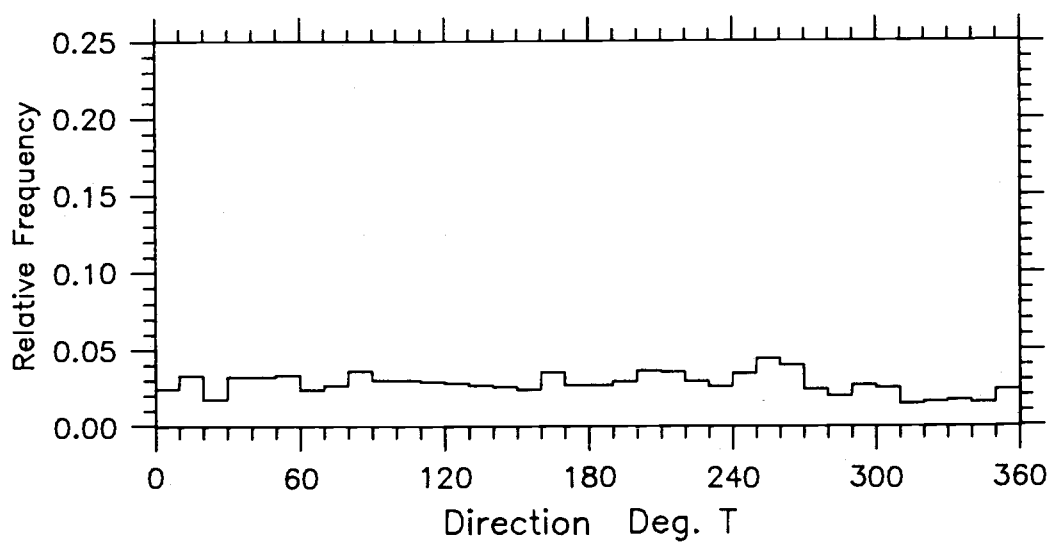
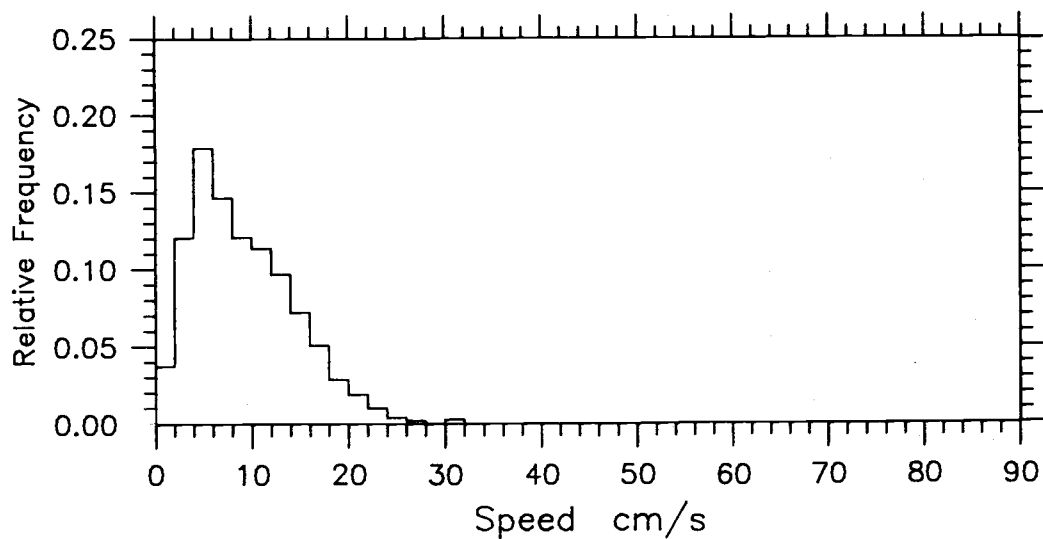
85 West Period VI



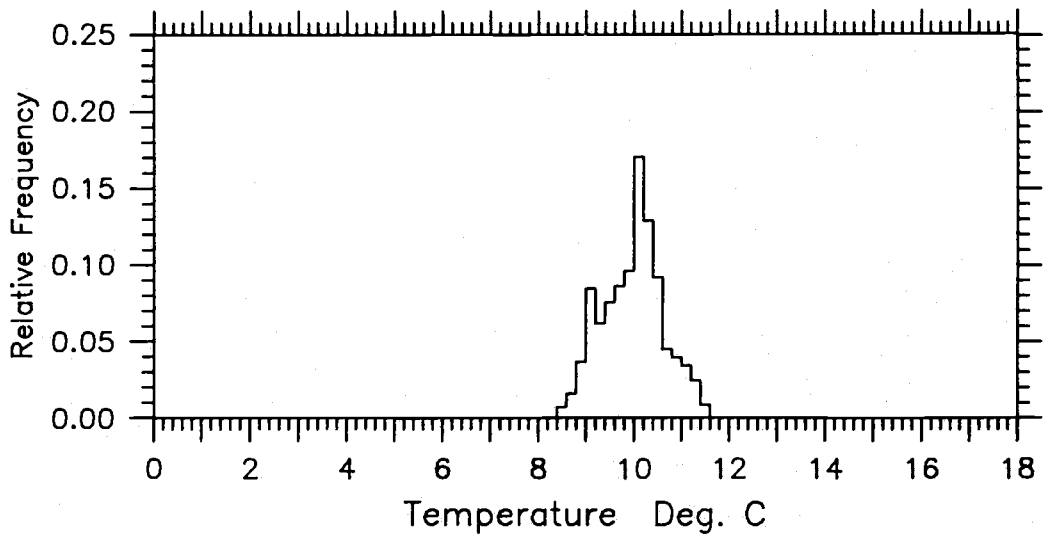
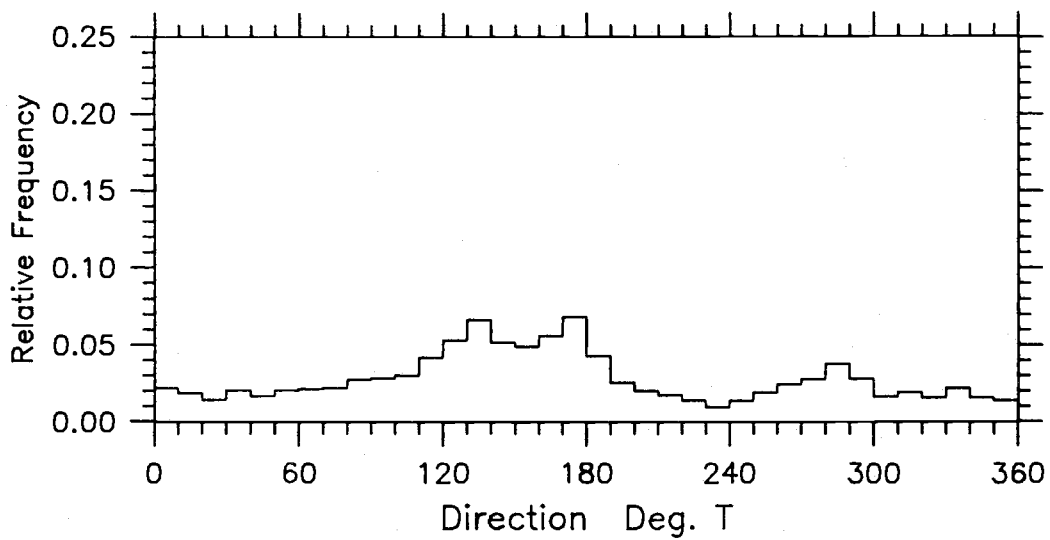
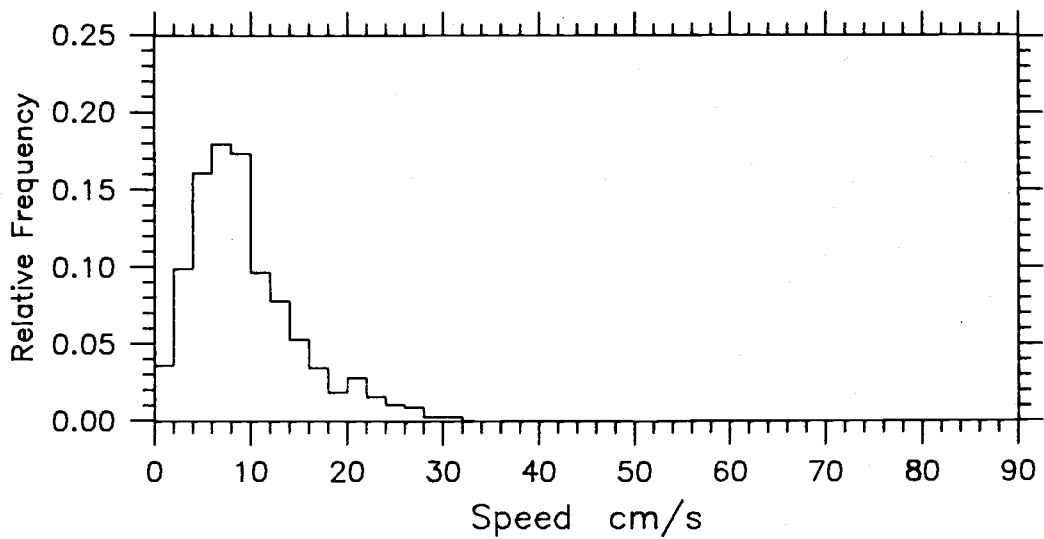




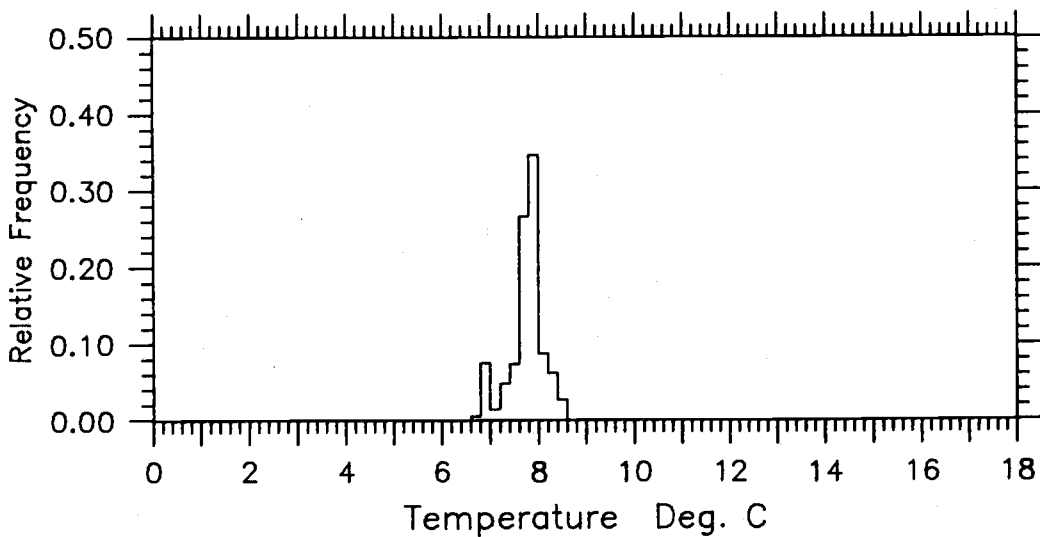
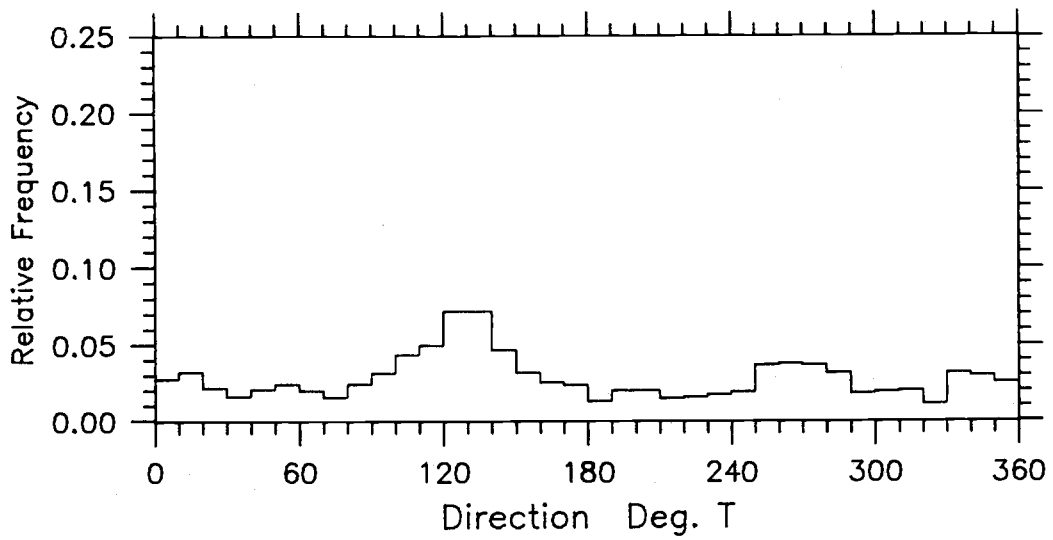
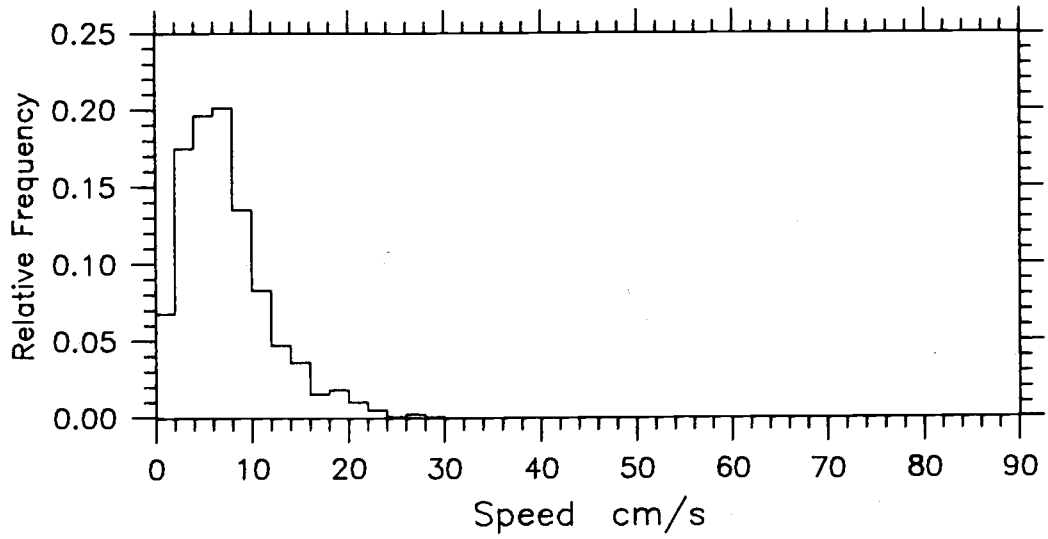
85 West Period IV 175m



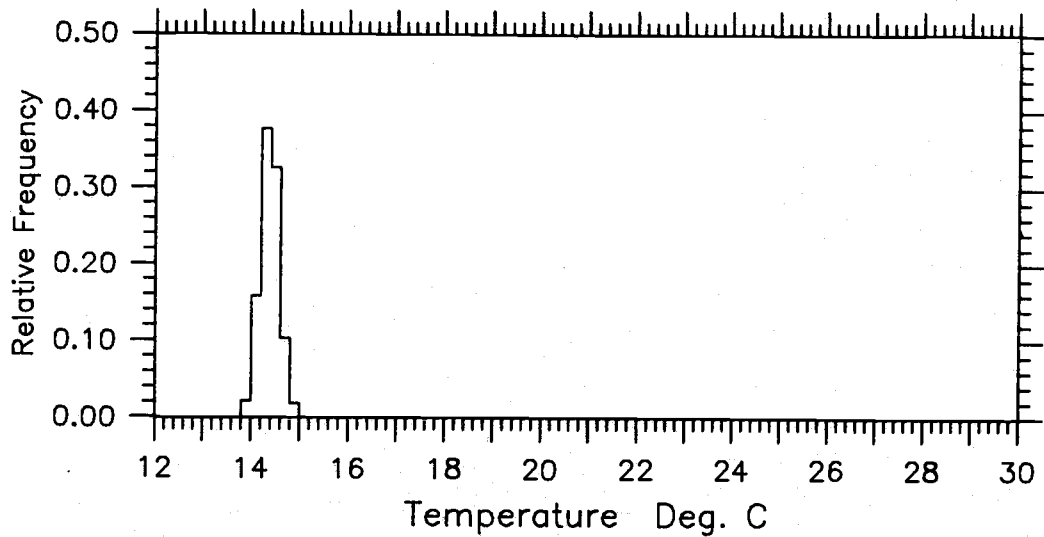
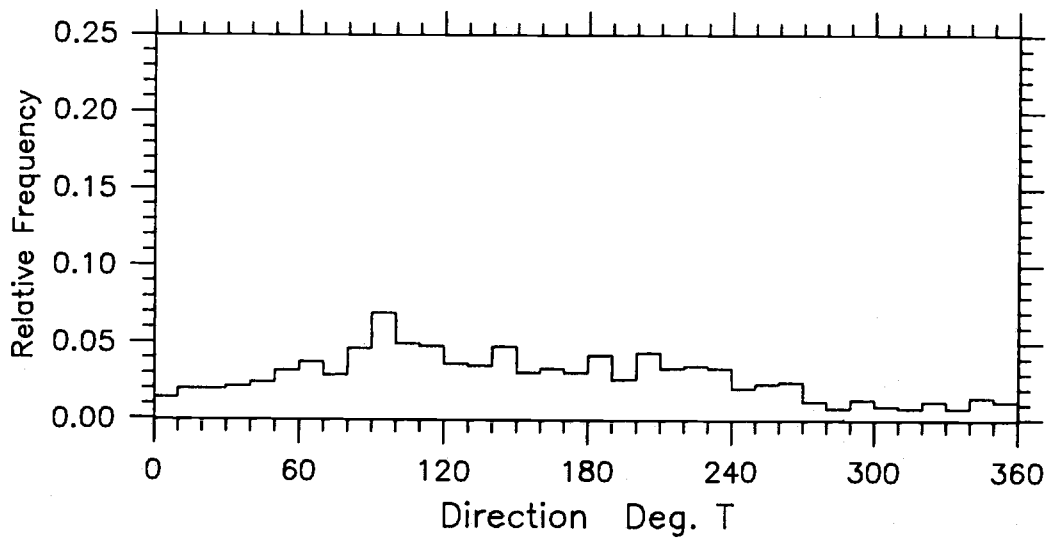
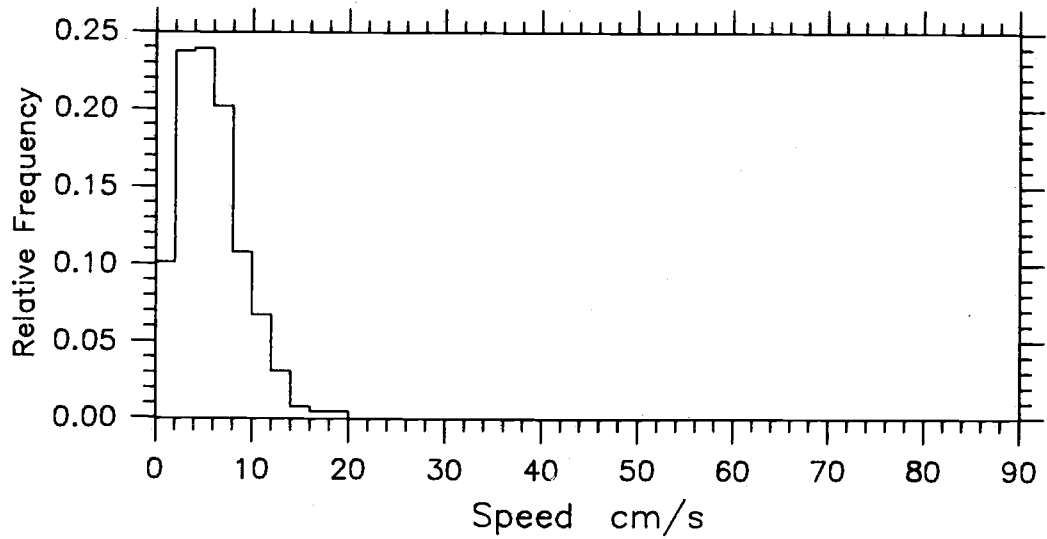
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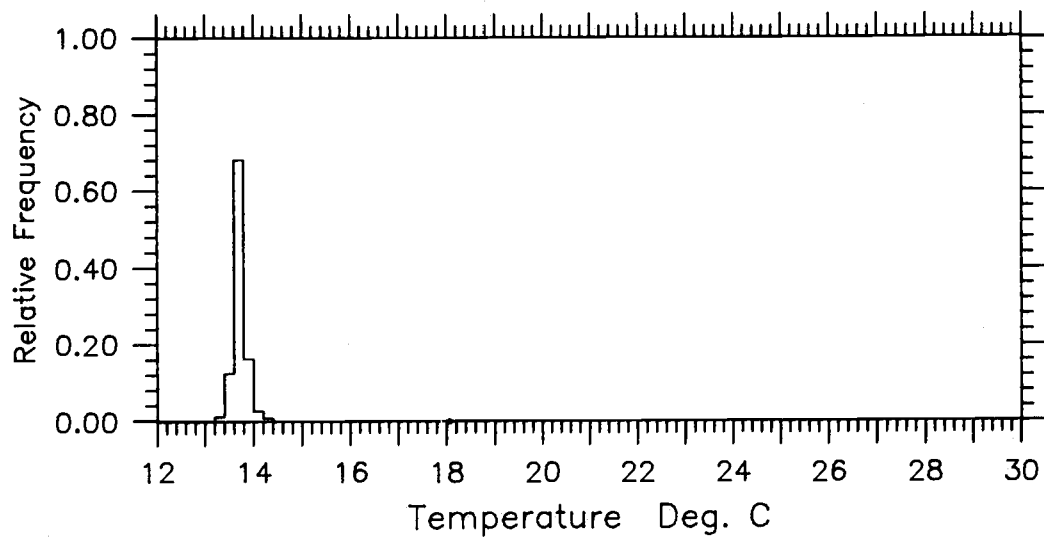
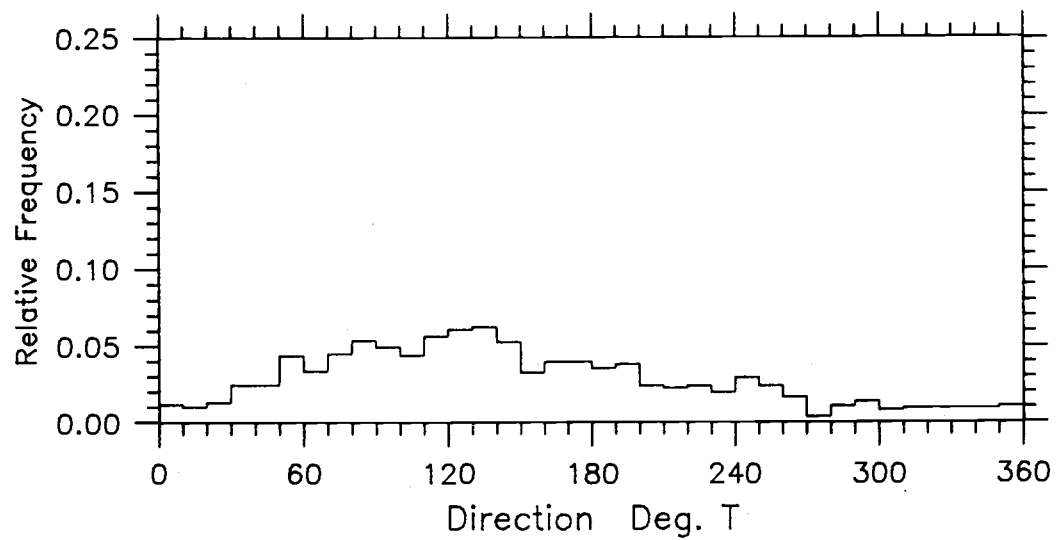
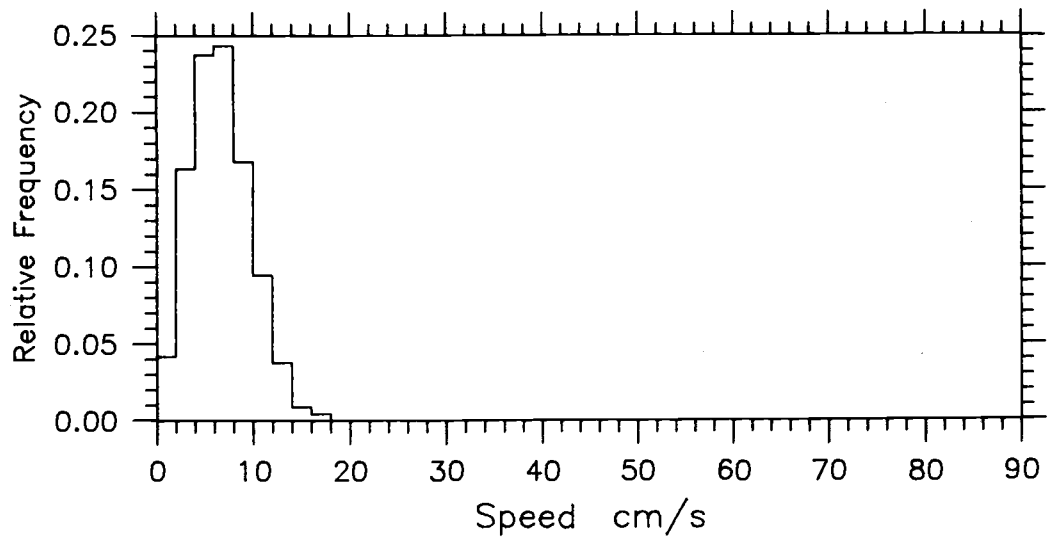
85 West Period IV 360m



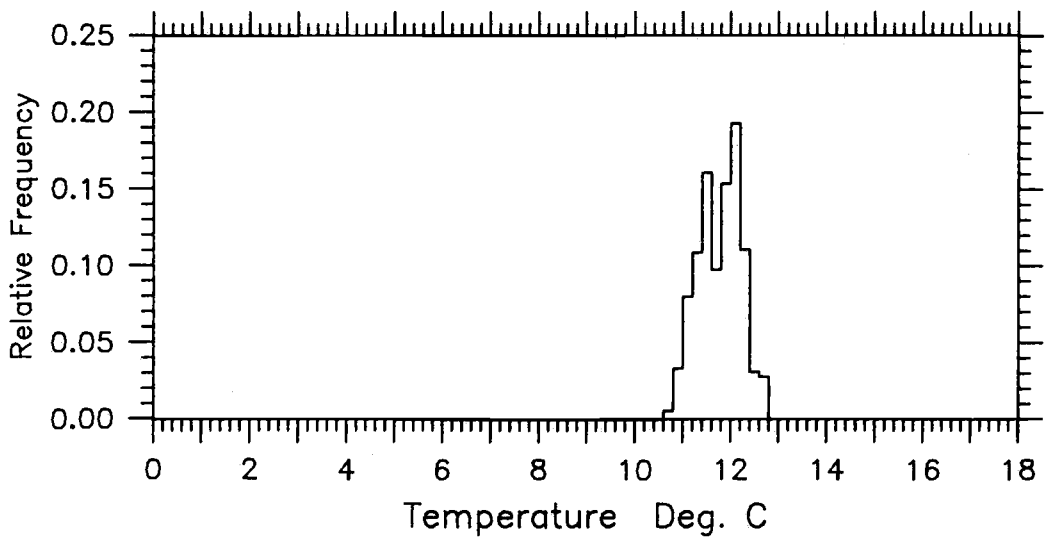
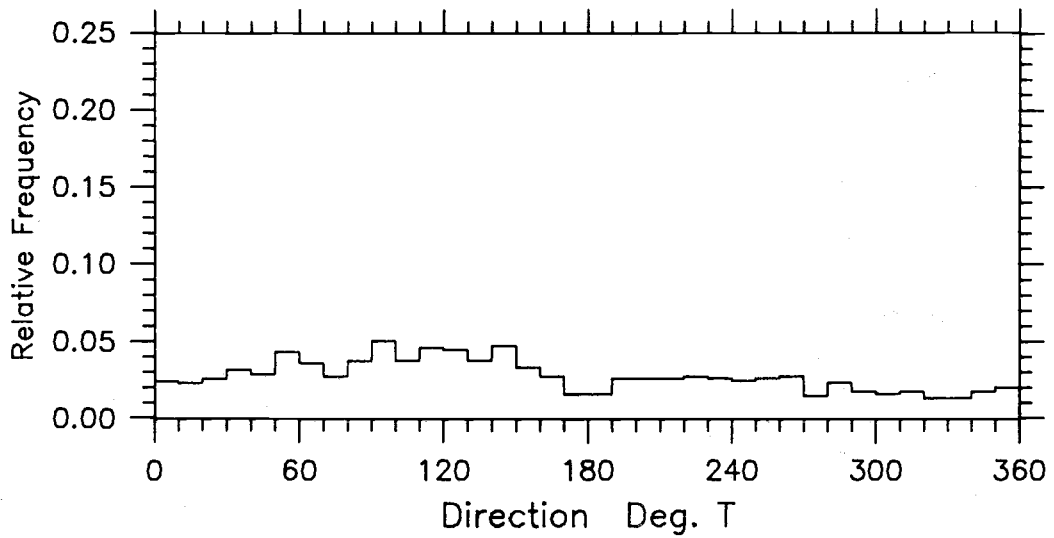
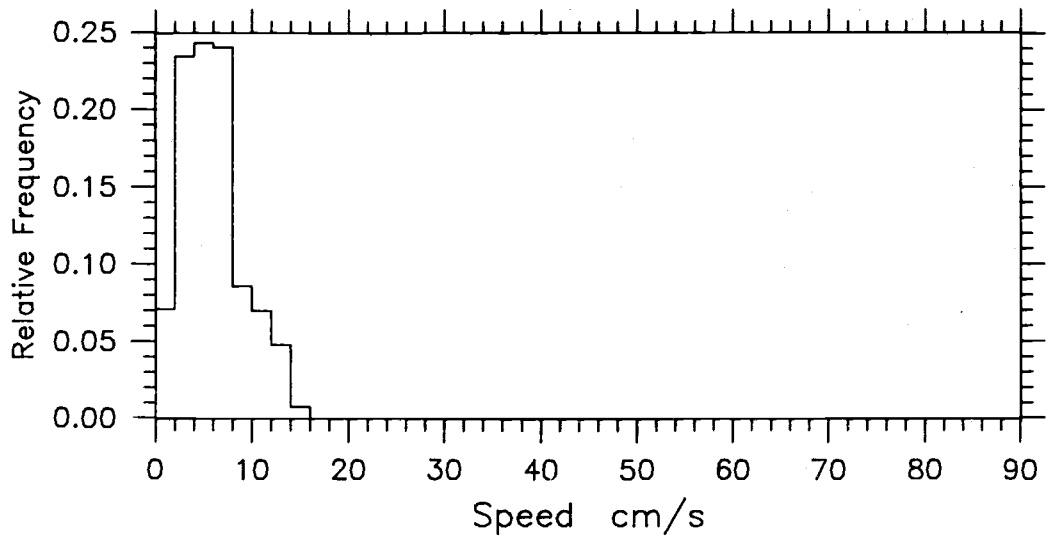
85 West Period IV 510m



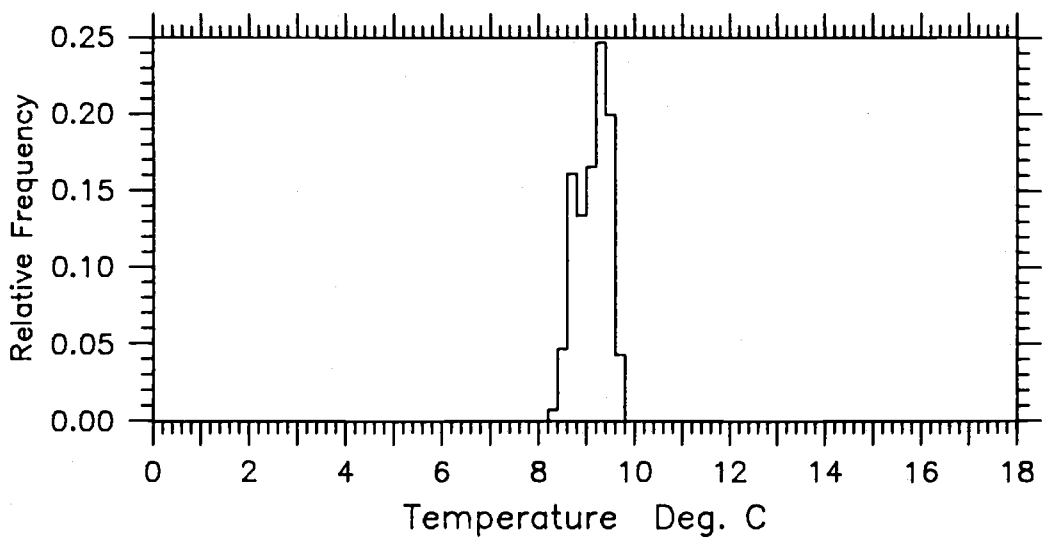
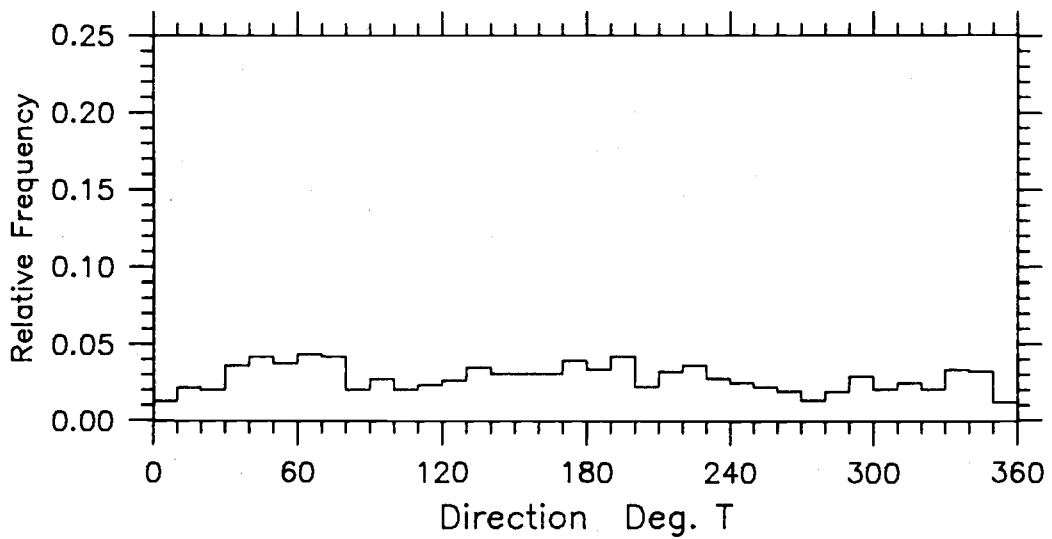
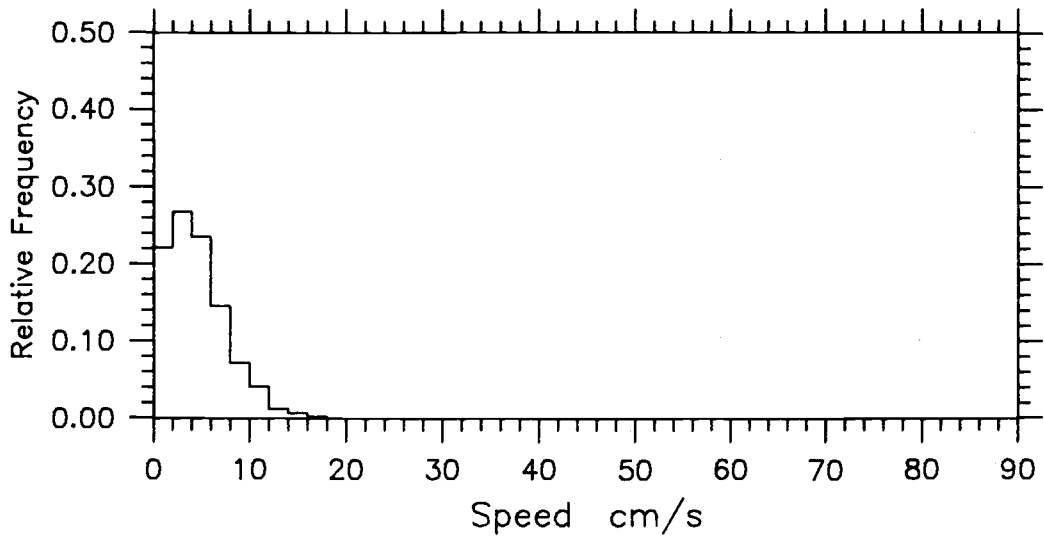
85 West Period V 107m



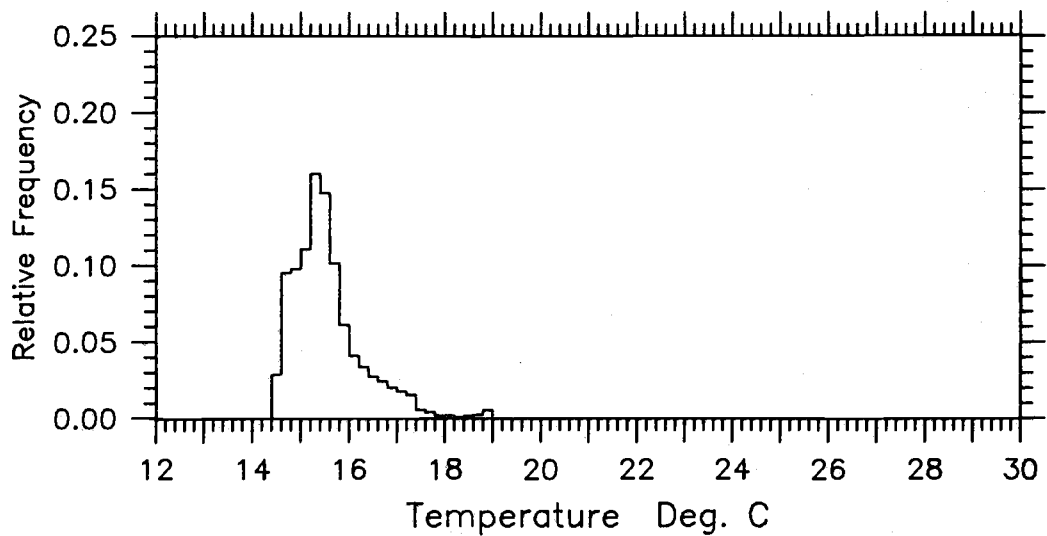
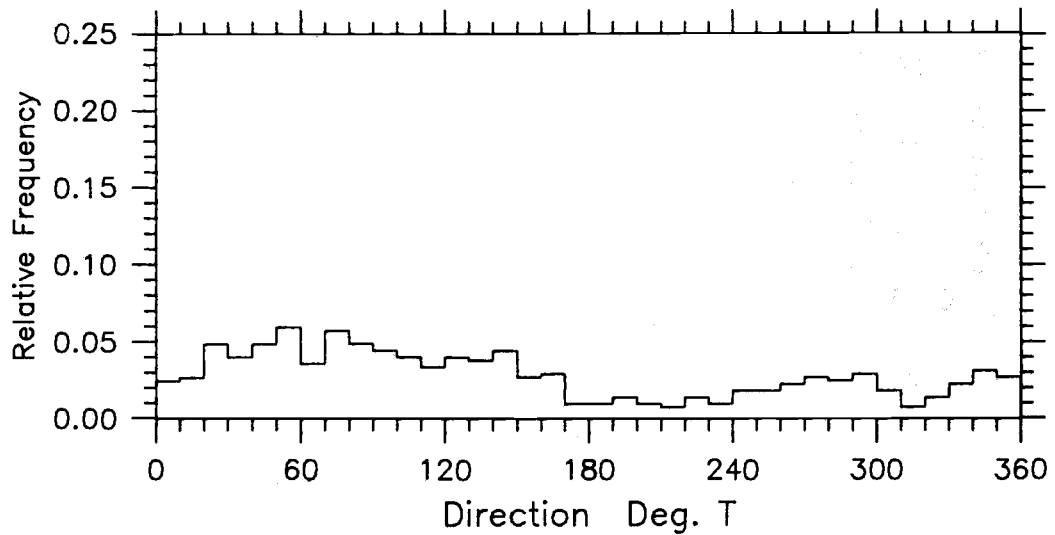
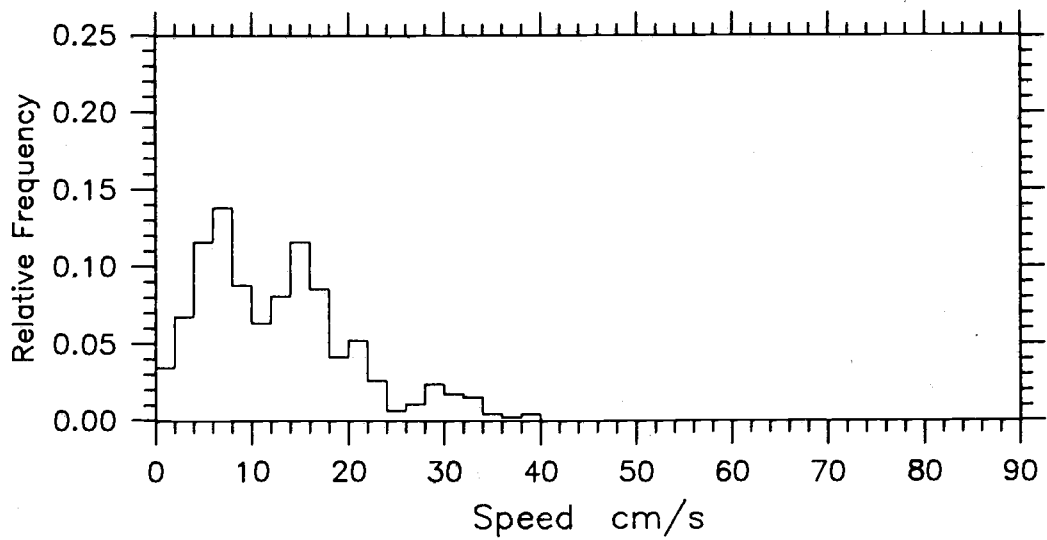
85 West Period V 157m



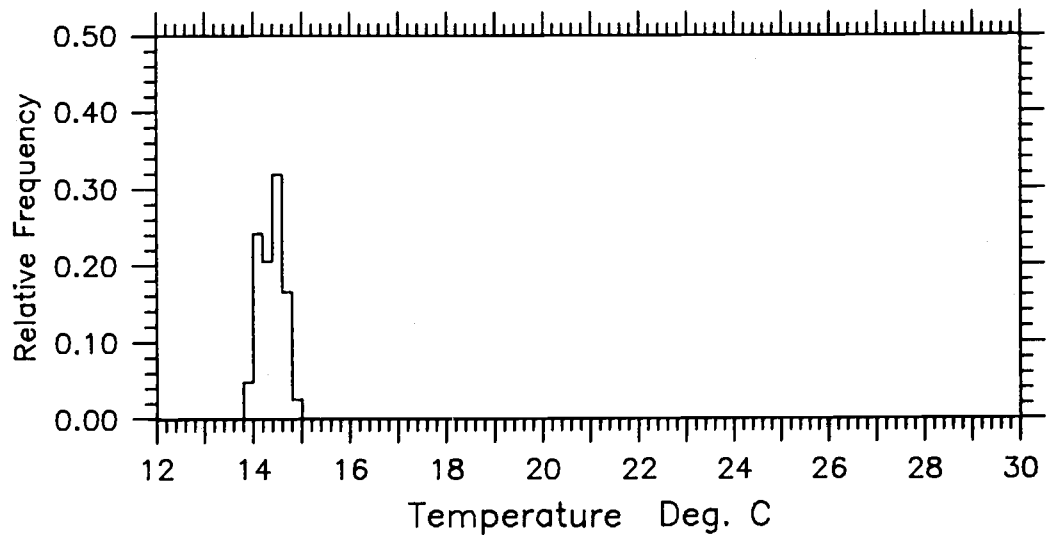
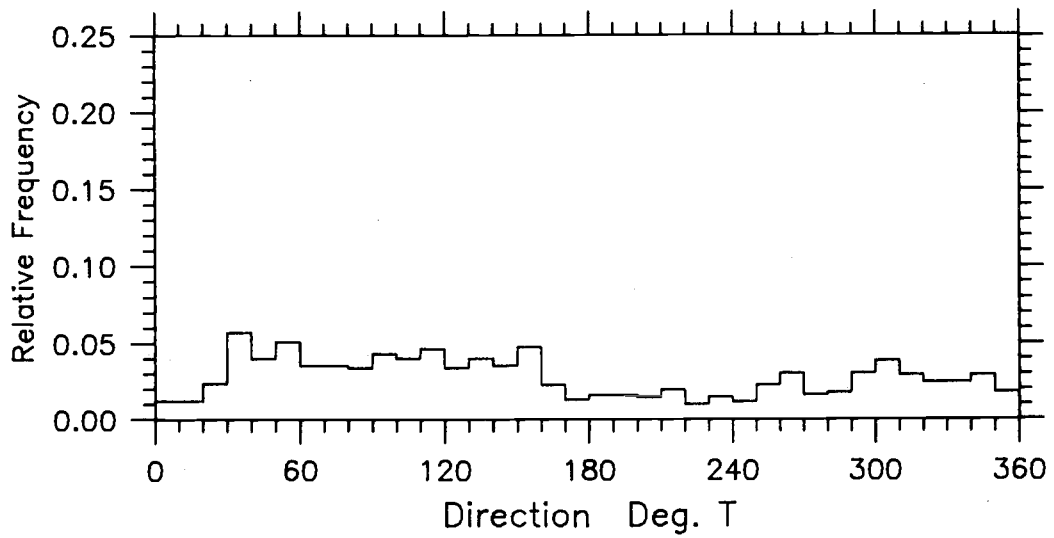
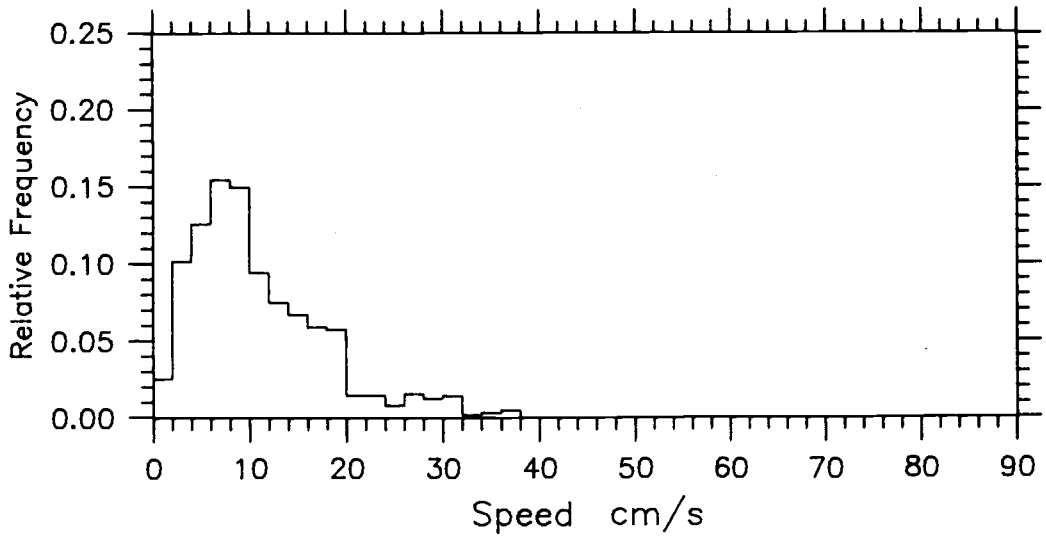
85 West Period V 282m



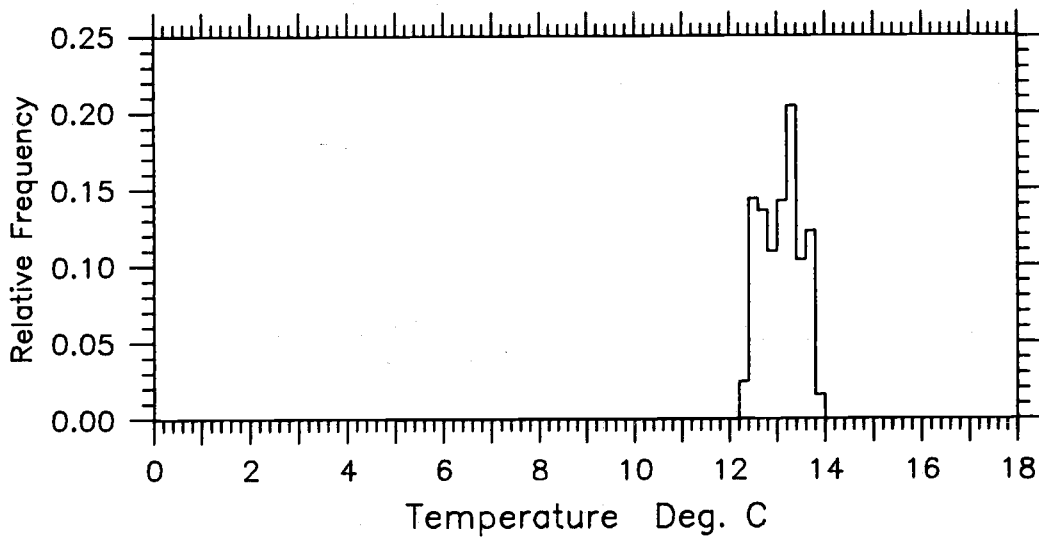
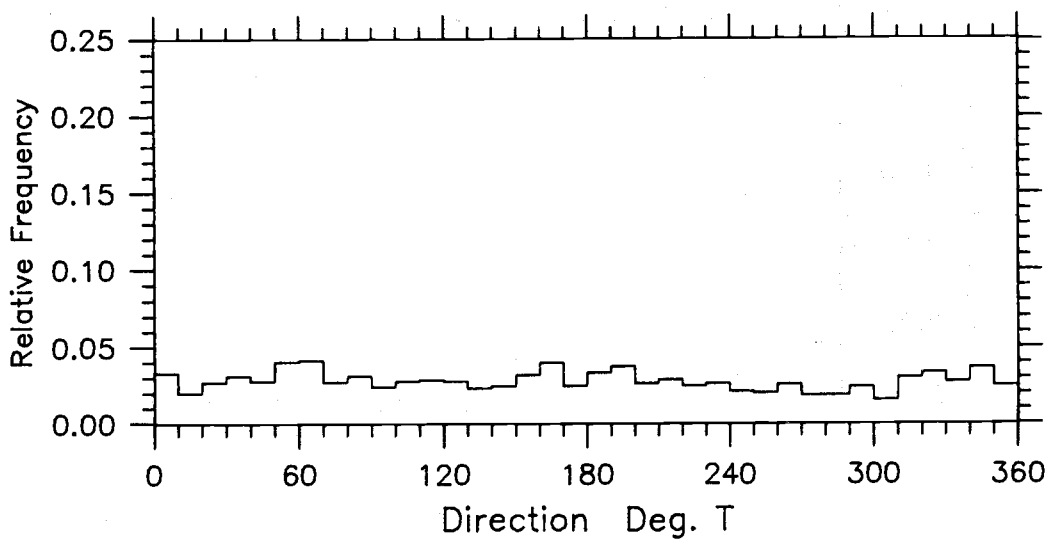
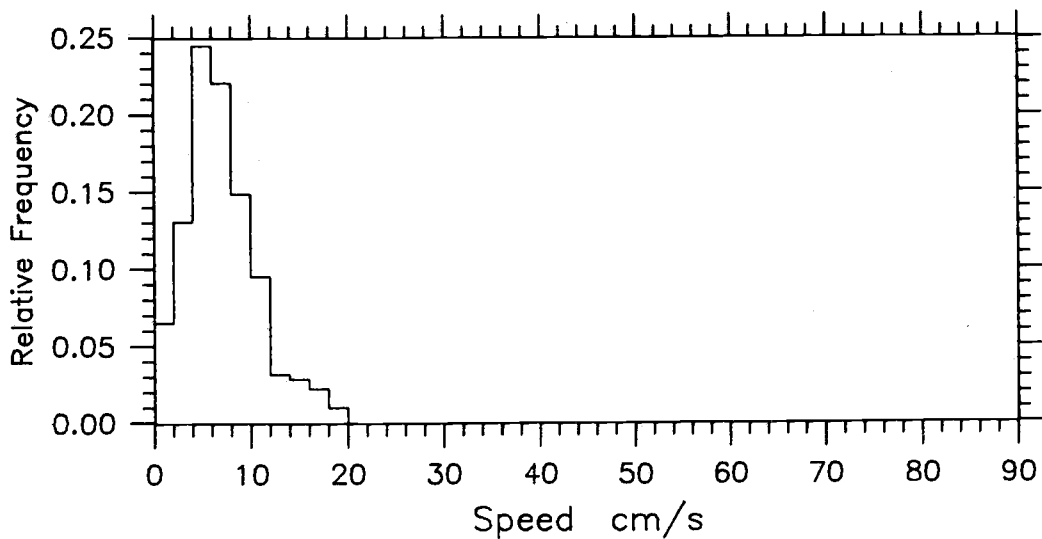
85 West Period V 418m



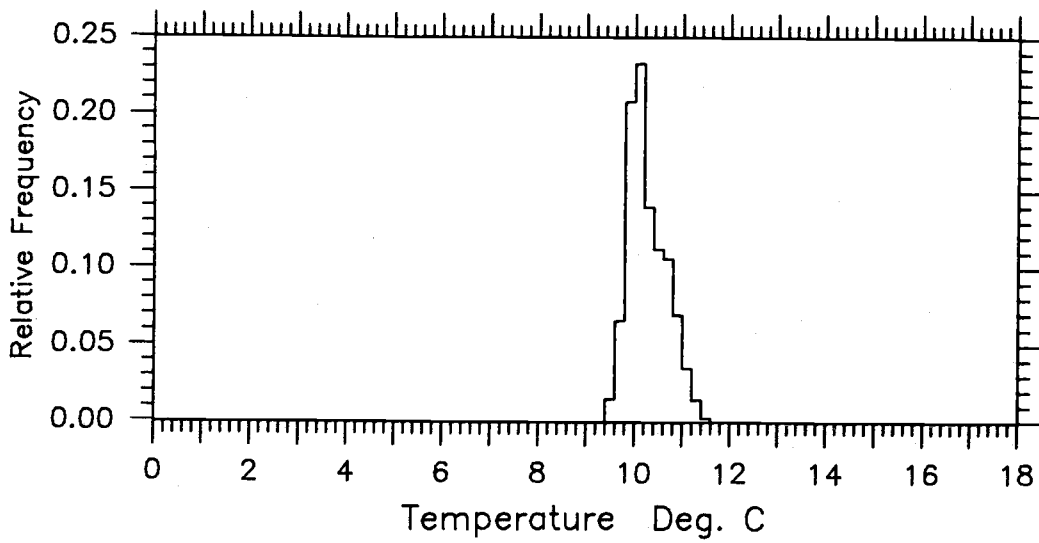
85 West Period VI 56m



85 West Period VI 107m



85 West Period VI 232m

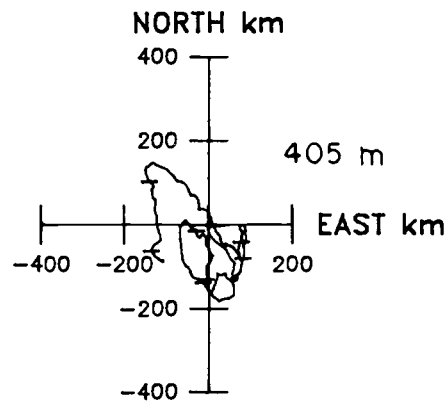
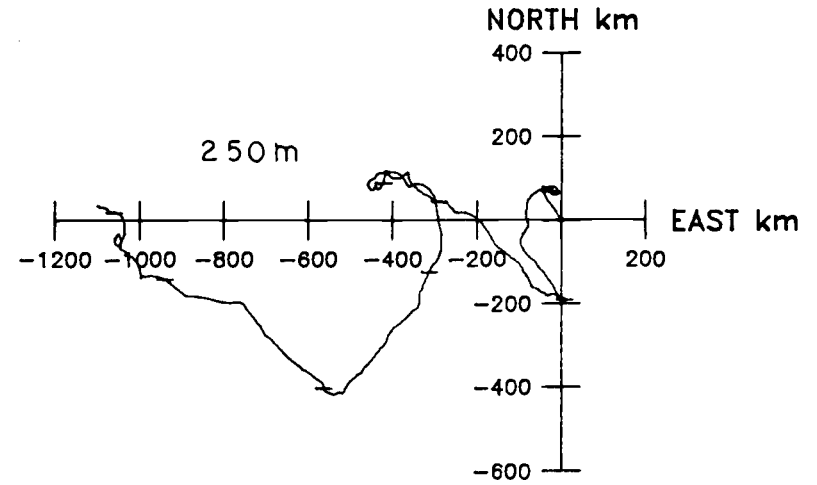
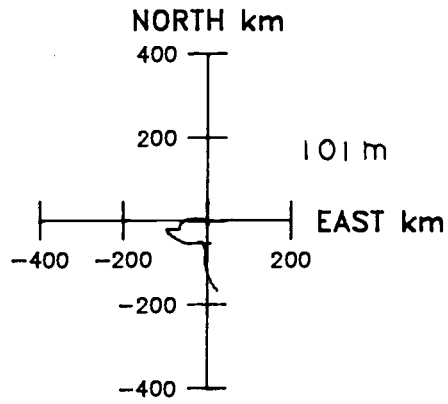


85 West Period VI 379m

MOORING 2 SOUTH

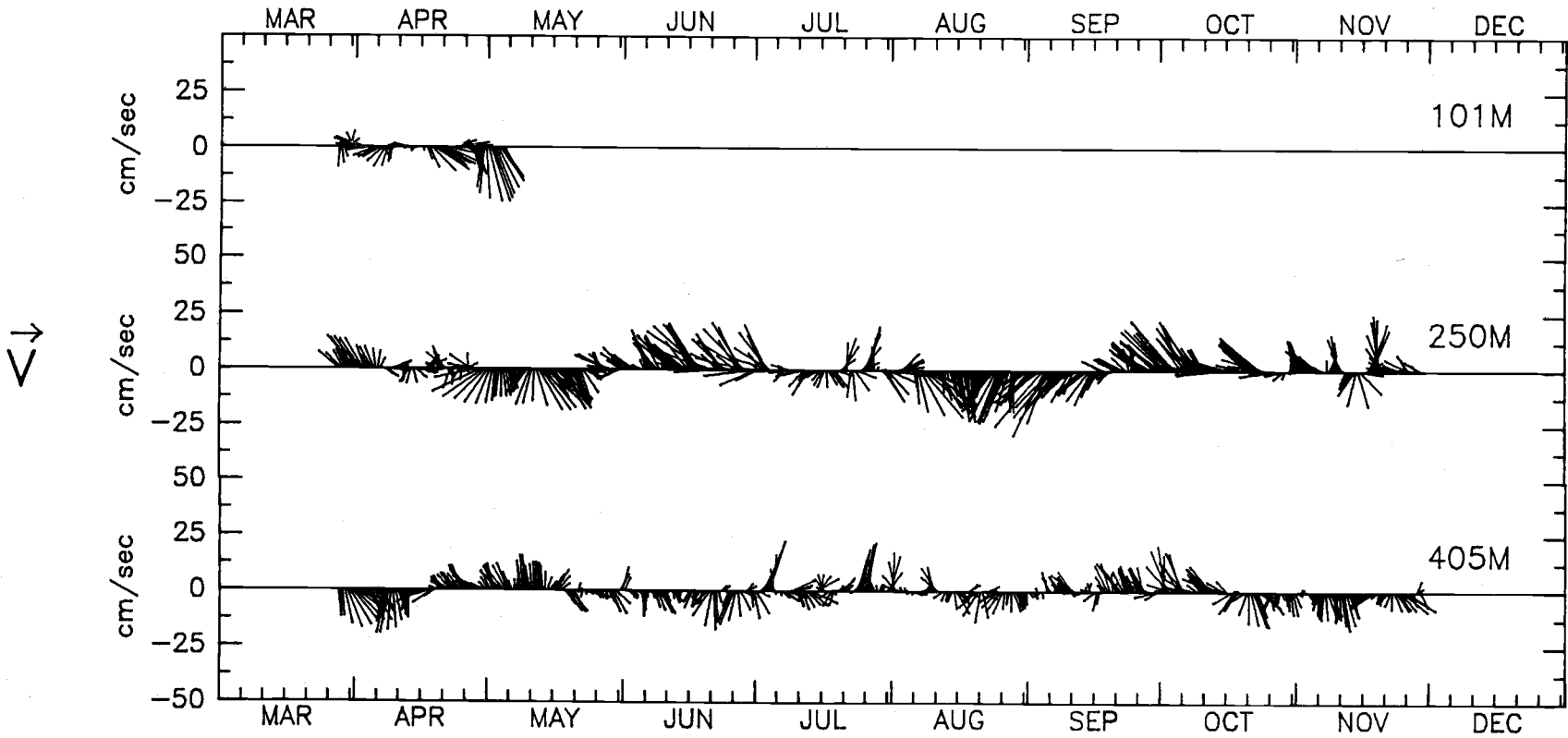
MOORING 2 South

PERIOD	INSTRUMENT DEPTH [m]	DATA POINTS		MEANS & (STANDARD DEVIATIONS)			MIN	MAX	VECTOR MEANS		PRINCIPAL
		U,V	T	U [cm/s]	V [cm/s]	T [Deg.C]	T [Deg.C]	T	SPEED [cm/s]	DIRECTION [Deg.T]	AXIS [Deg.T]
II	51		153			16.93 (0.59)	16.20	18.54			
	101	151	151	0.7 (8.4)	-5.1 (7.6)	15.61 (0.24)	15.06	16.24	5.2	171.8	-52.9
	250	985	985	-5.2 (9.0)	0.2 (11.2)	13.97 (0.54)	12.37	15.33	5.2	271.9	-27.8
	405	985	985	-0.5 (5.1)	-0.4 (8.1)	10.05 (0.58)	8.78	12.79	0.6	230.0	-15.8



2 South Period II

1982

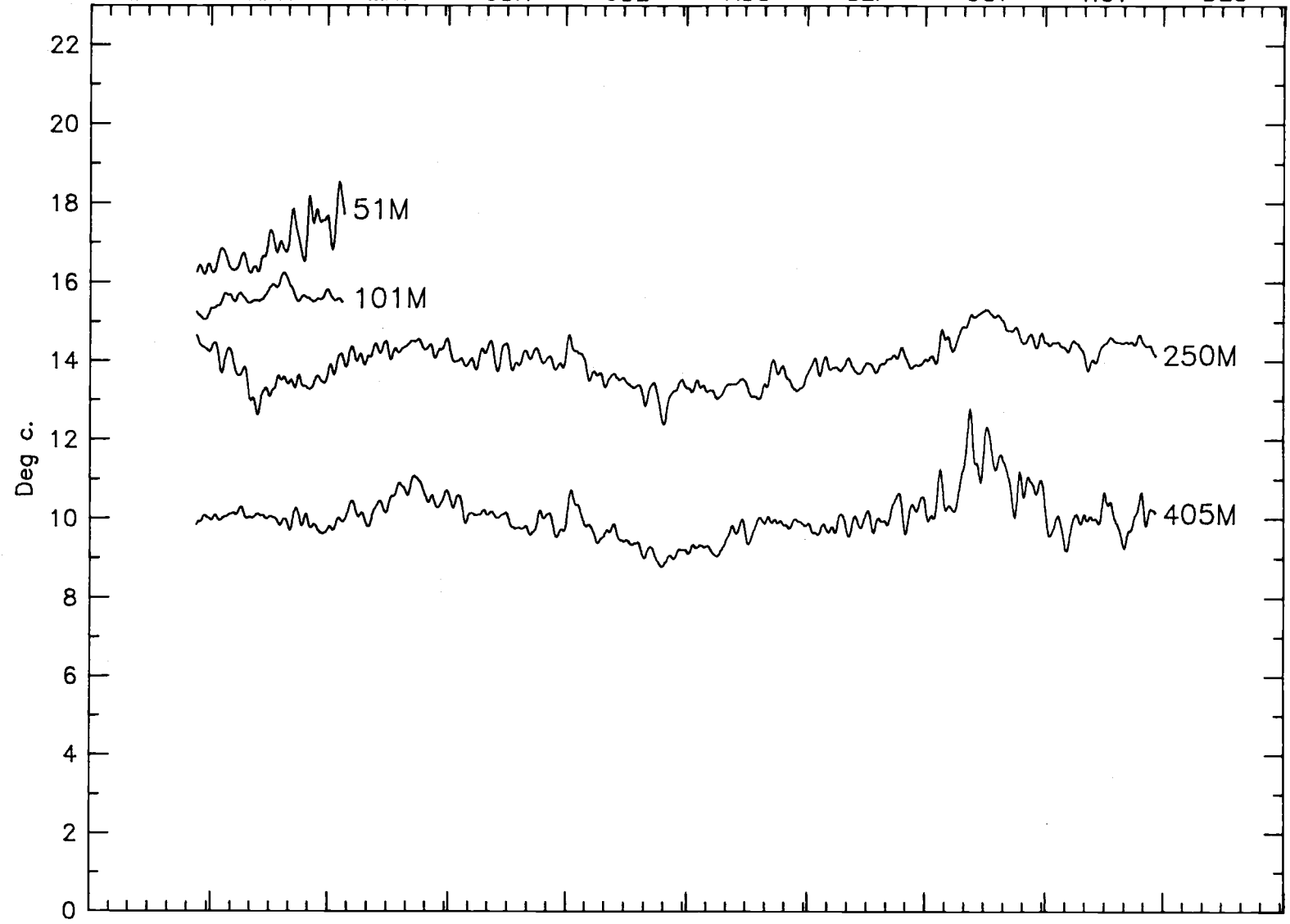


2 South Period II

1982

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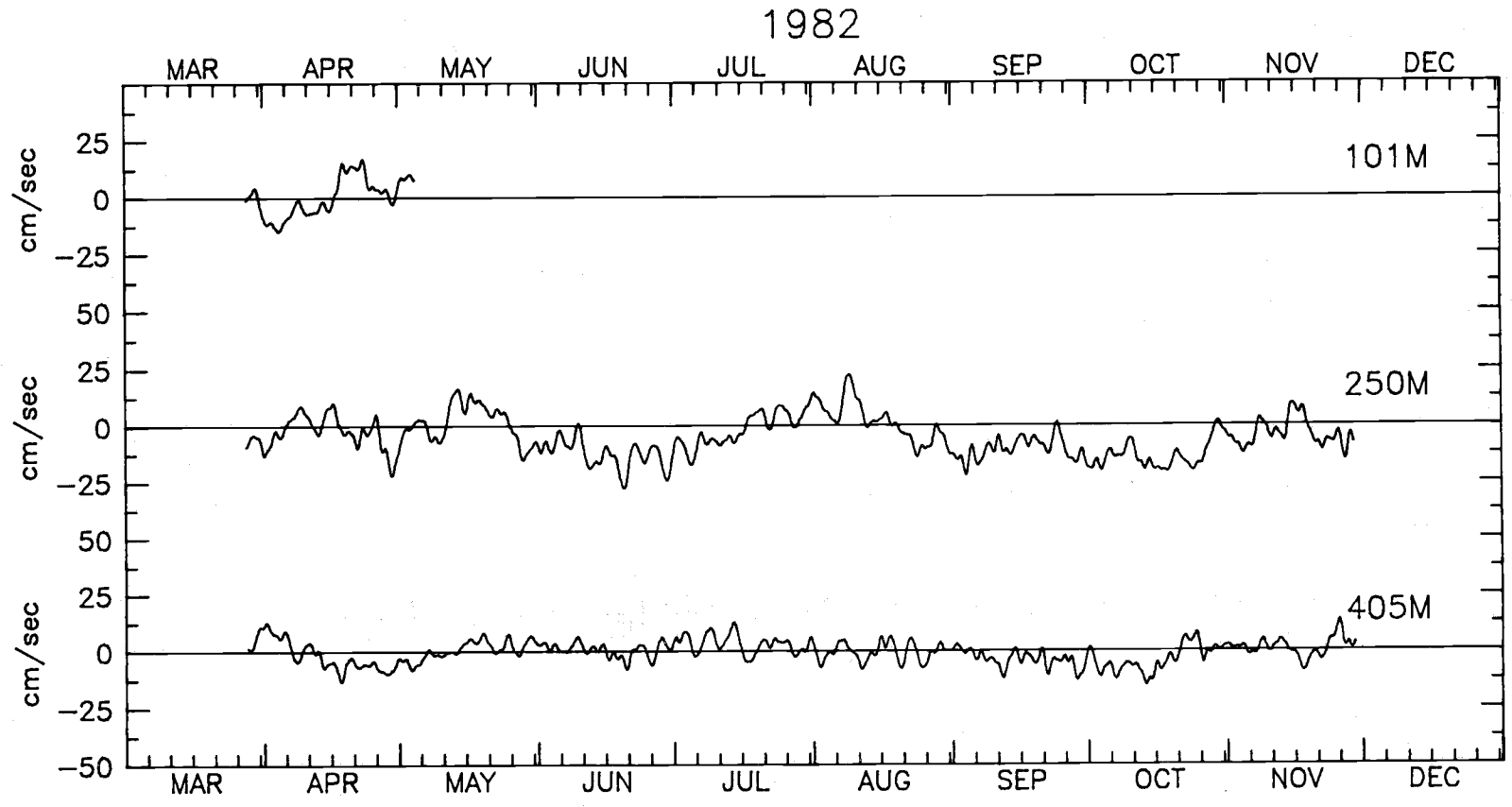
T



264

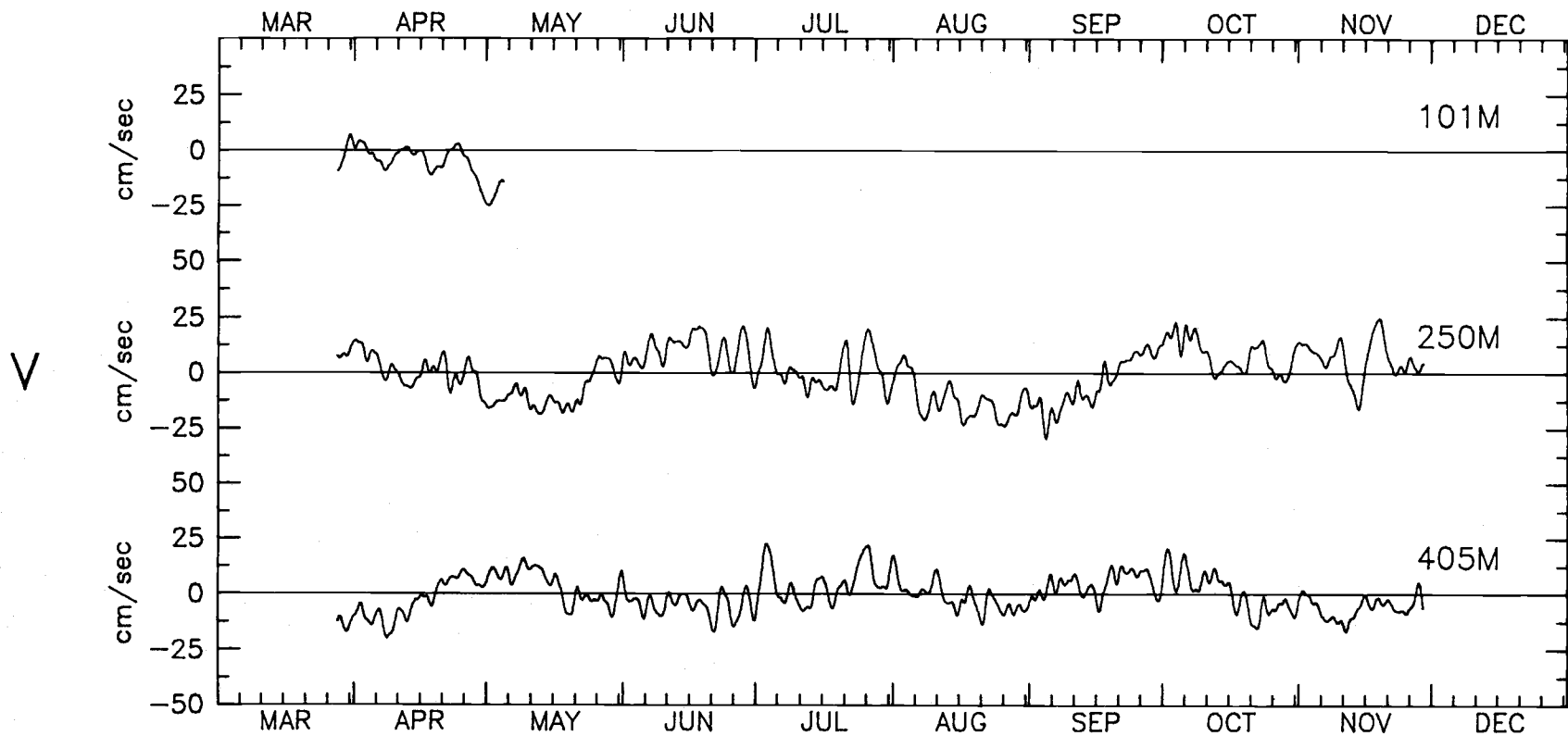
2 South Period II

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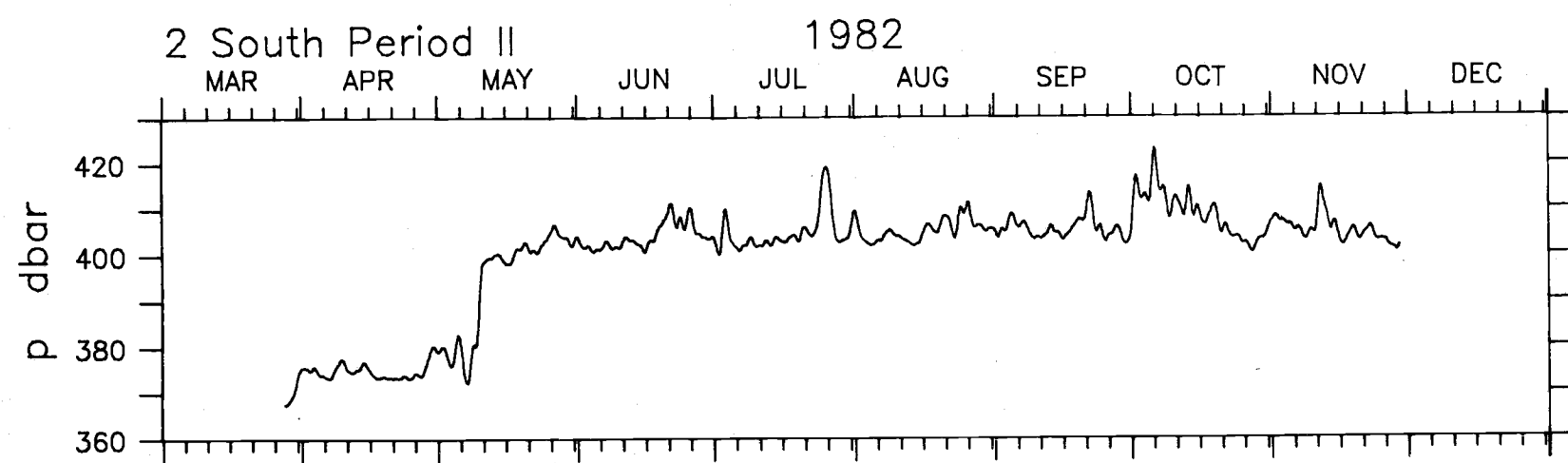
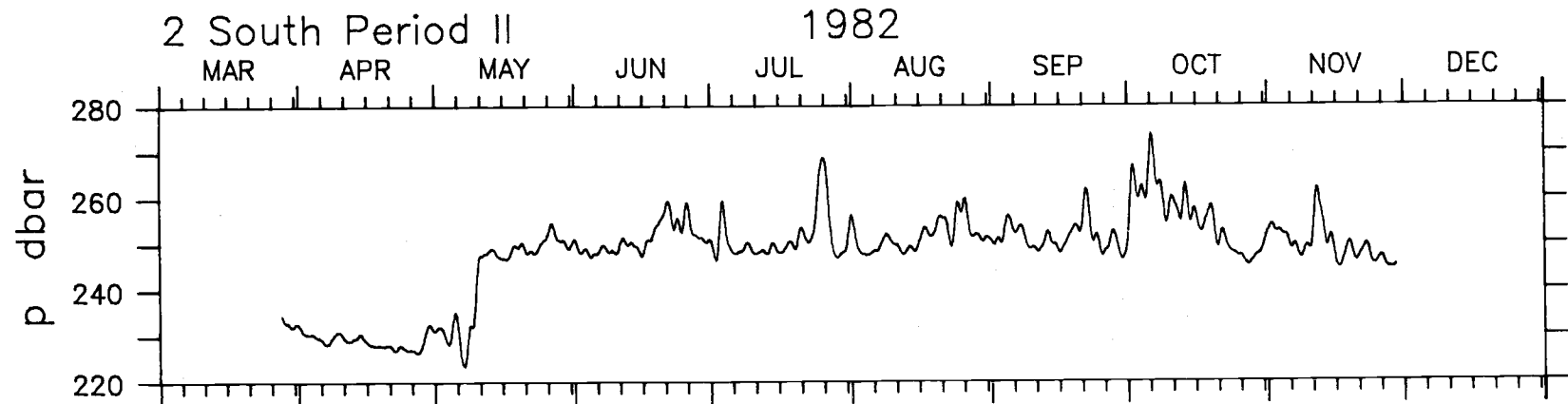
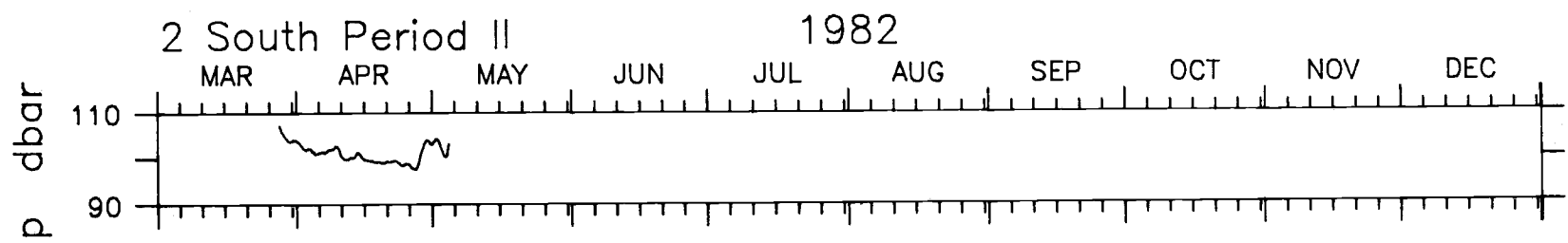
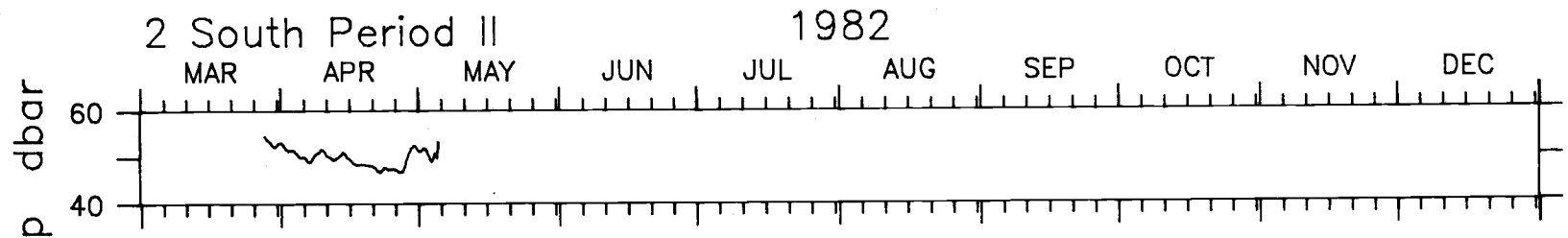


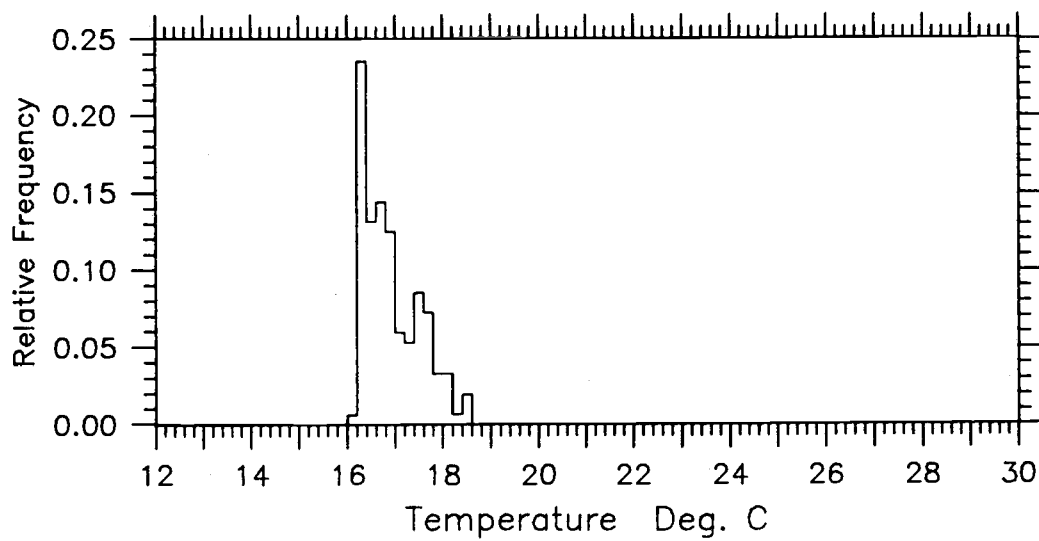
2 South Period II

1982

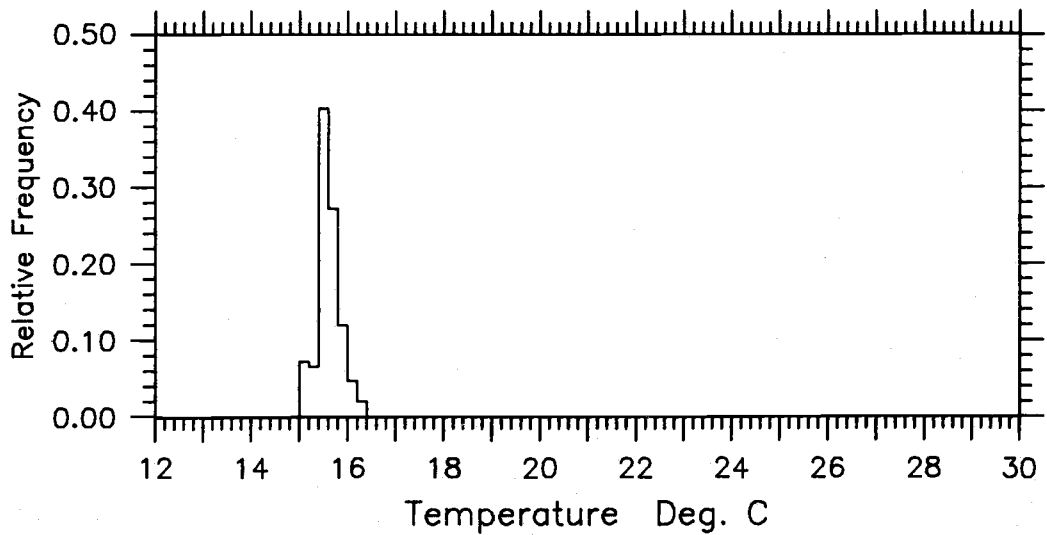
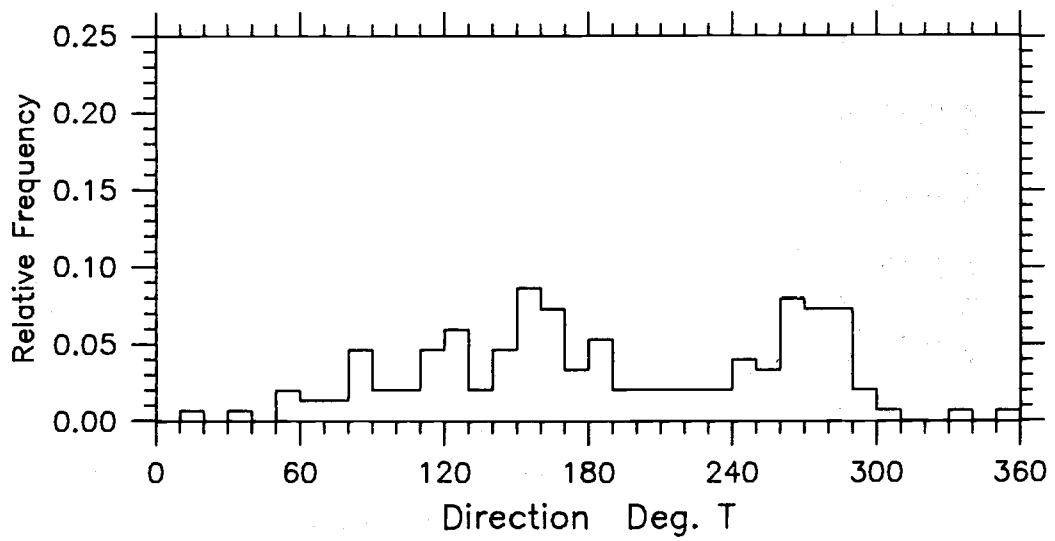
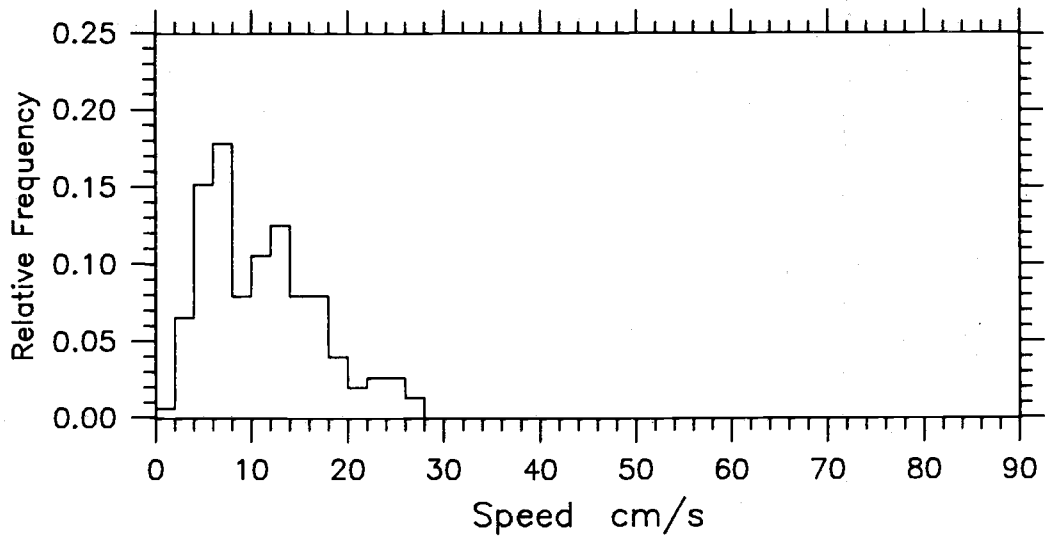


2 South Period II

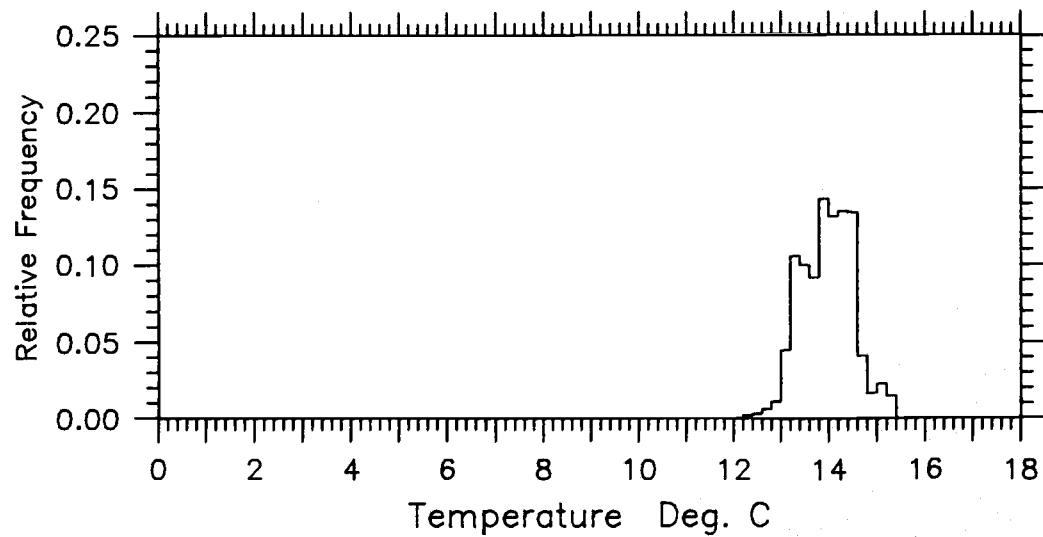
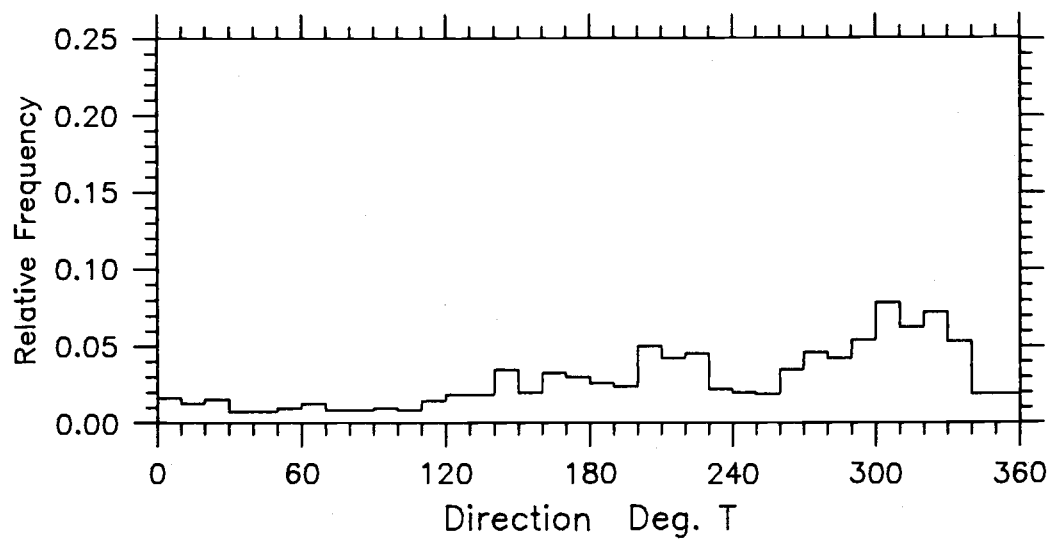
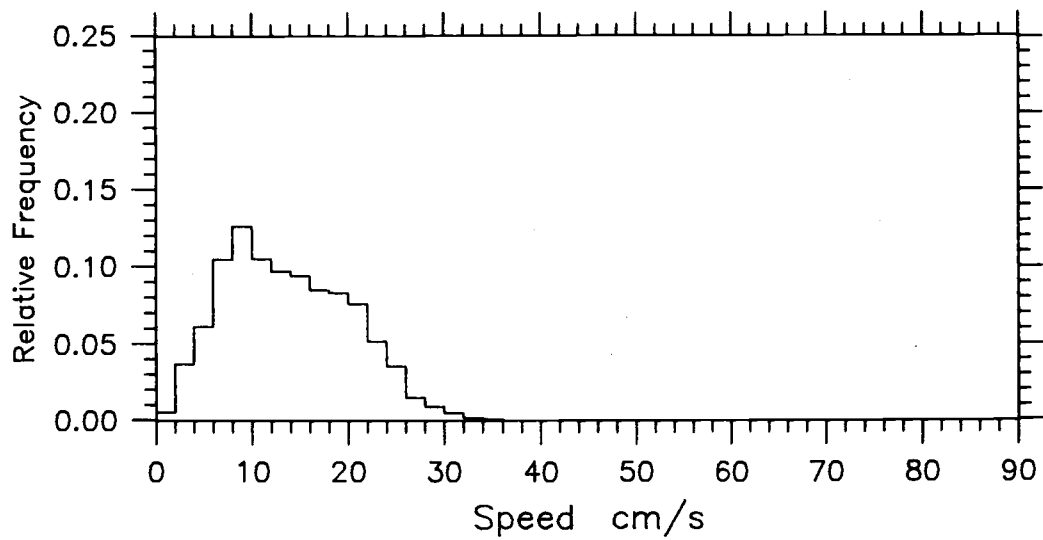




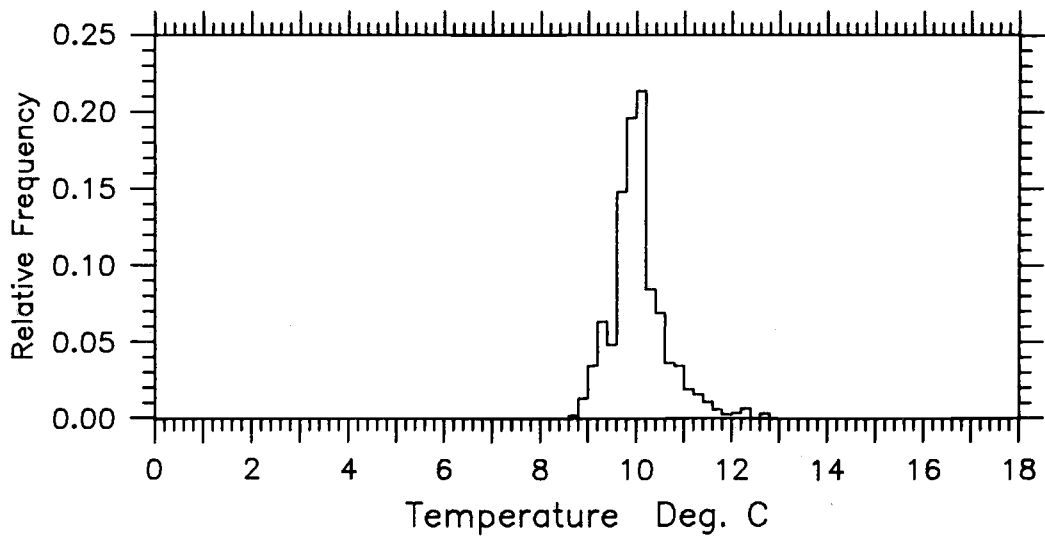
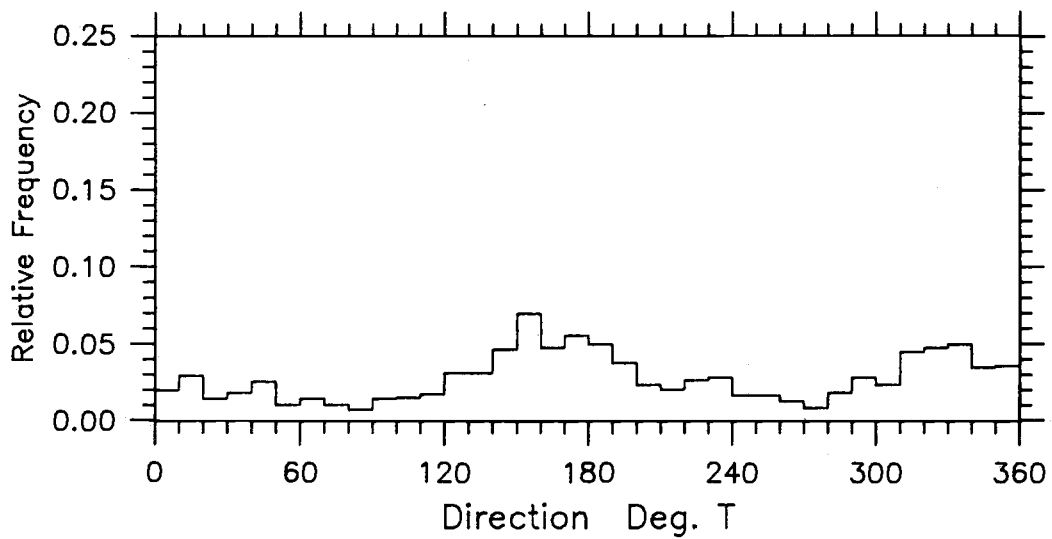
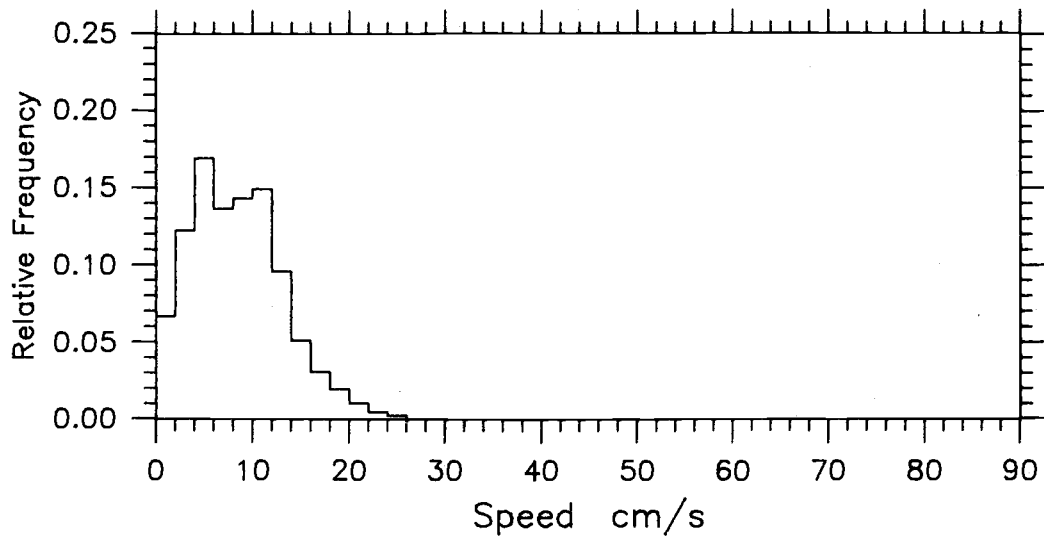
2 South Period II 51m



2 South Period II 101m



2 South Period II 250m



2 South Period II 405m